COUNTY
OF LEDUC

Rural Road System Study

Edmonton Metropolitan Regional Planning Commission

Final Report
Rural Road System Plan - Recommendations

Prepared by
Edmonton Metropolitan Regional Planning Commission
in co-operation with Battle River Regional Planning Commission
September 1986

ACKNOWLEDGEMENTS

The Edmonton Metropolitan Regional Planning Commission wishes to acknowledge the assistance of the following agencies:

- Battle River Regional Planning Commission
- Alberta Transportation
- Stanley Associates Engineering Ltd.
- County of Leduc Council and Administration

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I. INTRODUCTION

This report is the third and final report prepared as part of the County of Leduc Rural Road System Study. The first report, titled Existing Conditions and Trends, examined the roadway network and traffic conditions in the study area (Map 1), and provided a compilation of basic population, employment and land use information. The second report - Travel Forecasting and Evaluation - focussed on the transportation modelling process and the resulting trip forecasts for the 1995 horizon year. These forecasts were evaluated, and some general observations made, with respect to the future transportation requirements of the County of Leduc.

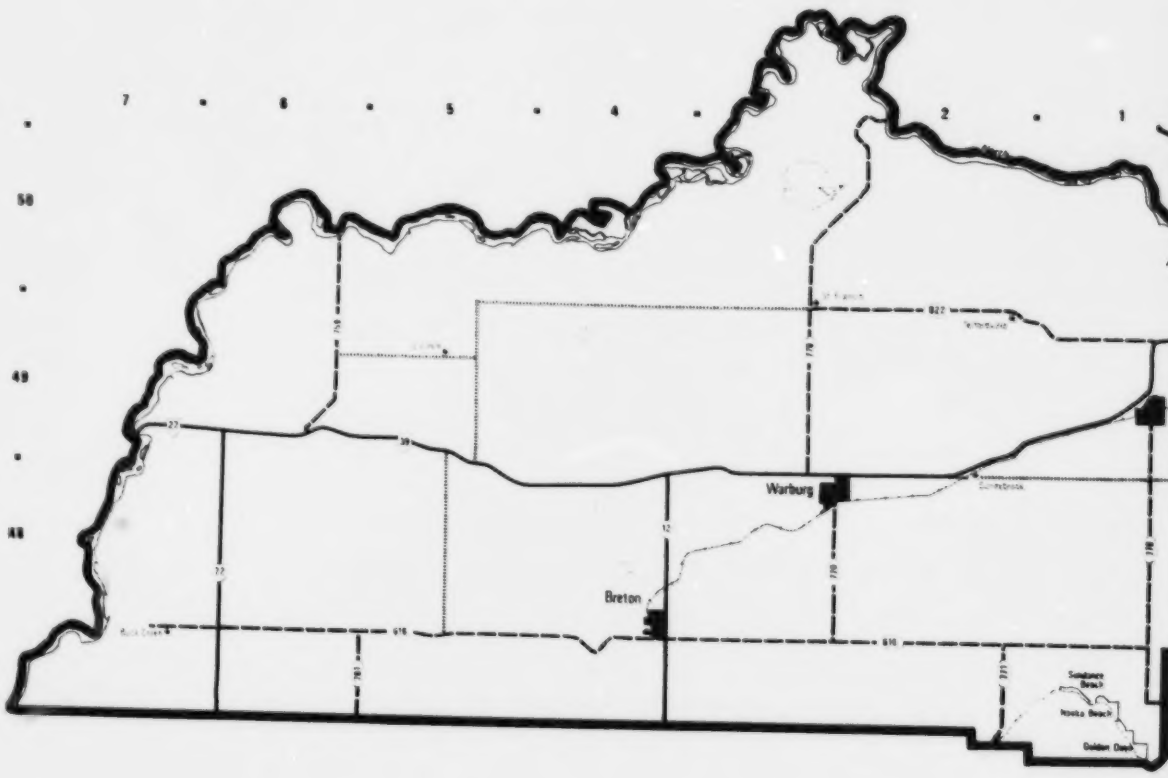
Parts II and III of this report summarize the key background information from the earlier reports. Part IV presents the recommended plan.

II. ROADWAY SYSTEM

The County of Leduc's existing road network is made up of eight primary highways, twelve secondary roads, ten county main roads and numerous local roads. The existing system is shown on Maps 2 and 3.

The planning, development and funding of primary highways come under full provincial jurisdiction. For secondary roads, these responsibilities are shared between provincial and municipal authorities, with right-of-way acquisition, maintenance and operation left to the local taxing authority. Primary highways and secondary roads together comprise the provincial roadway system.

County main roads and local roads fall under full municipal jurisdiction for funding, planning, right-of-way acquisition, maintenance and operation. The County main road system was designed to ensure, generally, that County residents have reasonably close access to an all-weather roadway facility.



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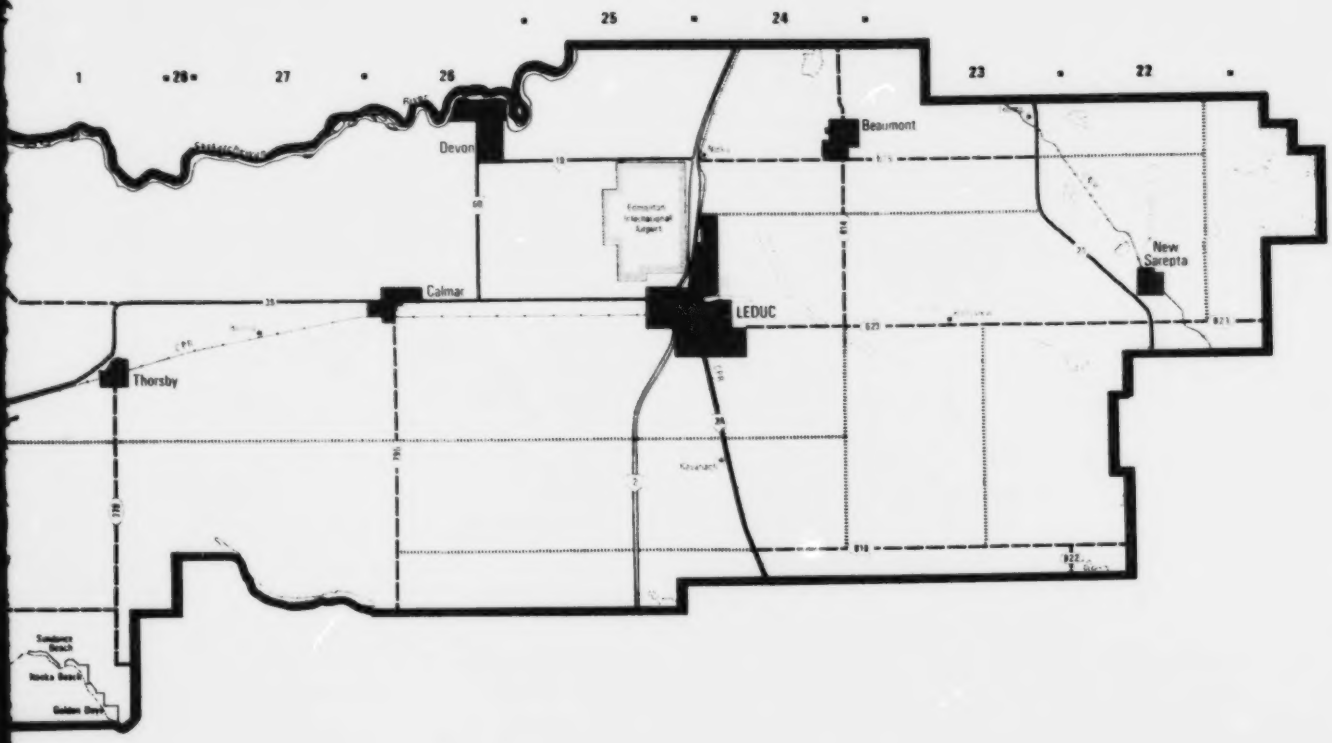

MAP 1

STUDY AREA

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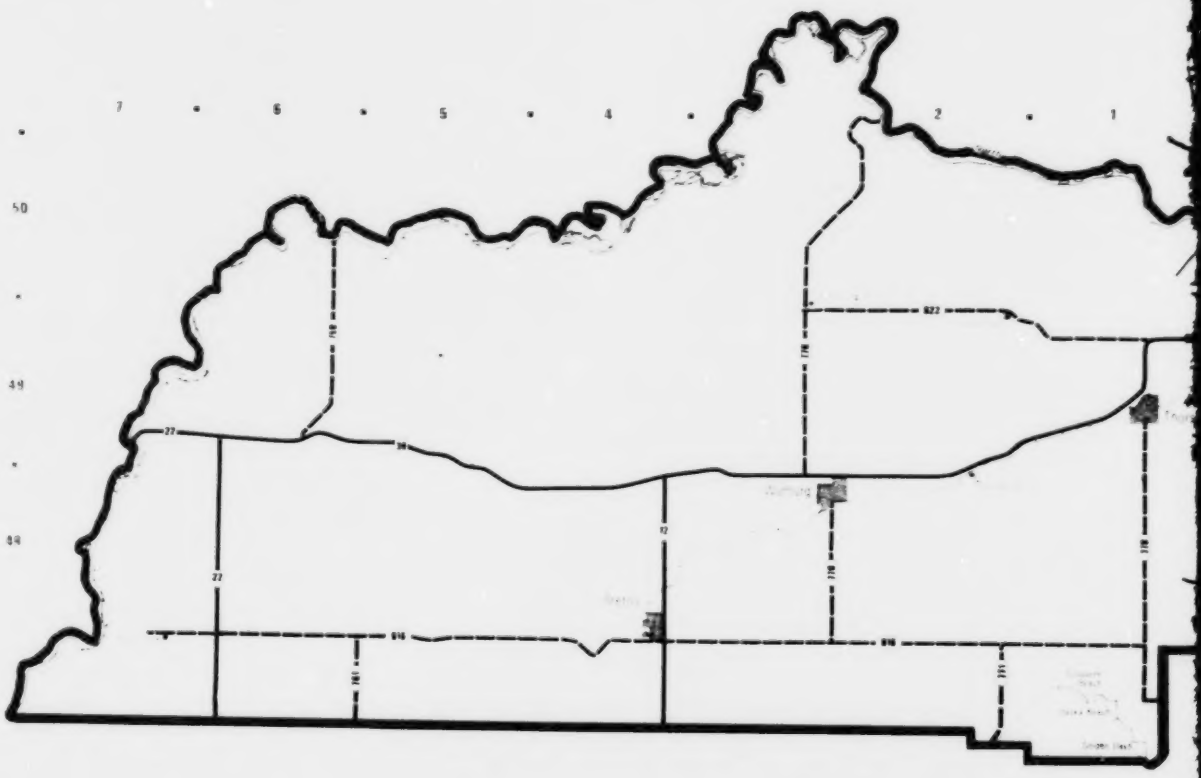

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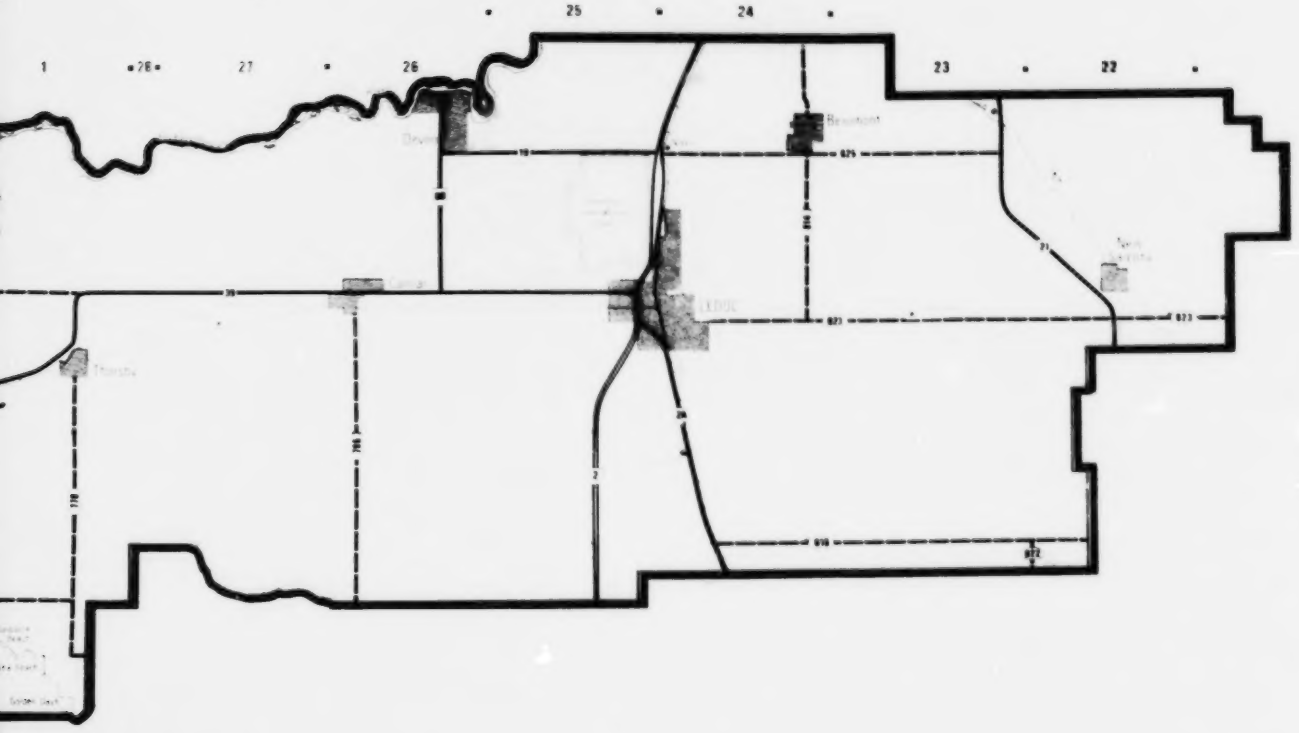

Primary Highway

Secondary Road

MAP 2

PRIMARY HIGHWAYS AND SECONDARY ROADS

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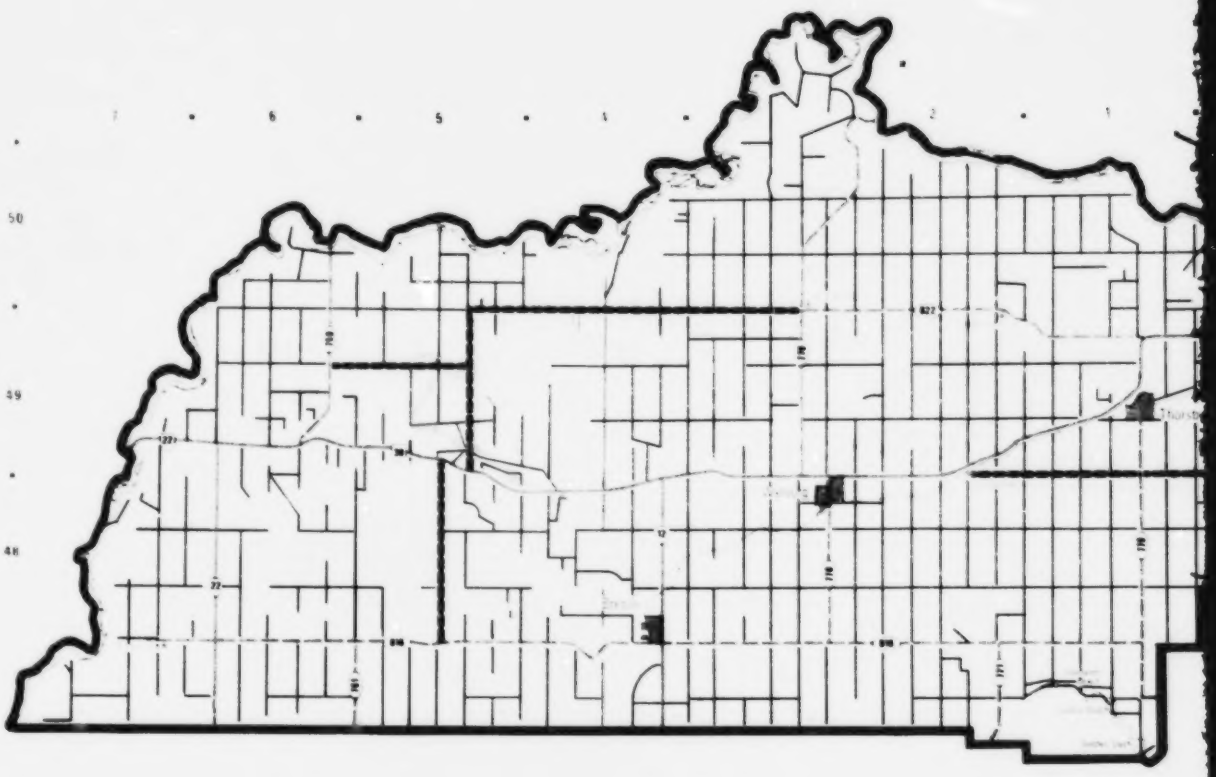

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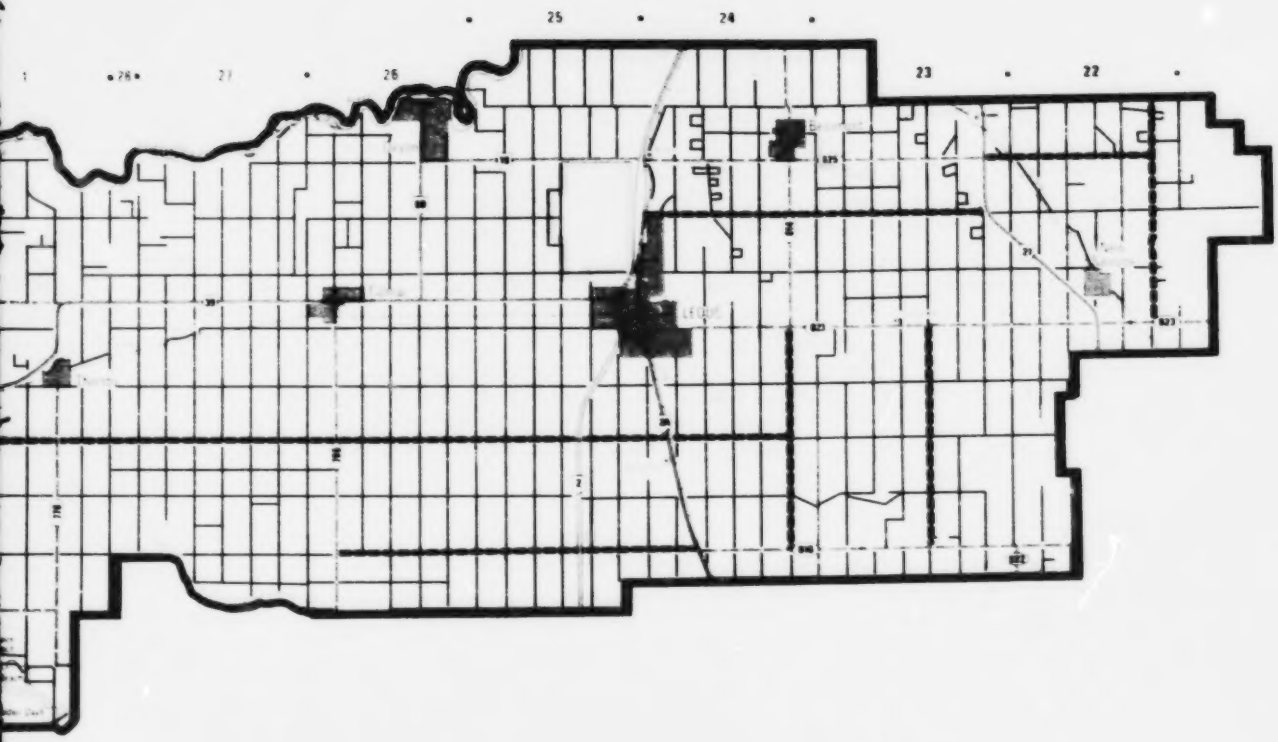

County Main Road

Local Road

MAP 3

COUNTY MAIN ROADS AND LOCAL ROADS

In addition to these administrative categories, the elements of the roadway system can be classified according to their predominant function, based on such factors as the volume of traffic they carry, the degree to which access is controlled, the type of service they provide, their links with other roadways, flow characteristics and usage by vehicle types. The four categories of function appropriate to the County of Leduc roadway system are: rural freeway/expressway; rural arterial; rural collector; and local road. This classification of the existing roadway system is shown on Map 4.

Highway 2 is currently the only rural expressway in the County of Leduc. All other primary highways in the County are designed as rural arterial facilities, although Highway 12 functions predominantly as a rural collector.

Rural expressways are built to accommodate the movement of large volumes of traffic under free-flow, high speed conditions. Rural expressways connect the larger cities, industrial concentrations and recreational areas. They also serve larger international and interprovincial travel movements.

Rural arterial roads are also intended to move large volumes of traffic at high speeds. The major distinction between this class and the rural expressway class is in the degree of control of access. Rural arterial roads, together with freeways, serve as major routes in a road network connecting the major economic regions and centers such as large cities, industrial concentrations, agricultural areas and recreational facilities. Rural arterial roads should be designed for uninterrupted flows of traffic, except at controlled intersections with major crossroads.

Secondary roads are classified as rural collector roadways although some, such as SR 814 and SR 625, tend to perform an arterial function, while the function of others, such as SR 761, is more local in nature. By collecting traffic from local roads and county main roads and distributing it to arterials and expressways, collector roads provide inter-community service and access to farm markets, recreation areas and rural areas.

County main roads attract higher traffic volumes and provide a more continuous route than purely local roads. They perform a minor collector function and provide inter-community service by channelling local traffic and distributing it to other collectors, arterials and, in some cases, expressways.

Local roadways are developed principally for providing direct access to abutting properties. Since these roads are not designed to move large volumes of traffic, they are generally not very continuous and may operate at low speeds, depending on the condition of the road surface.

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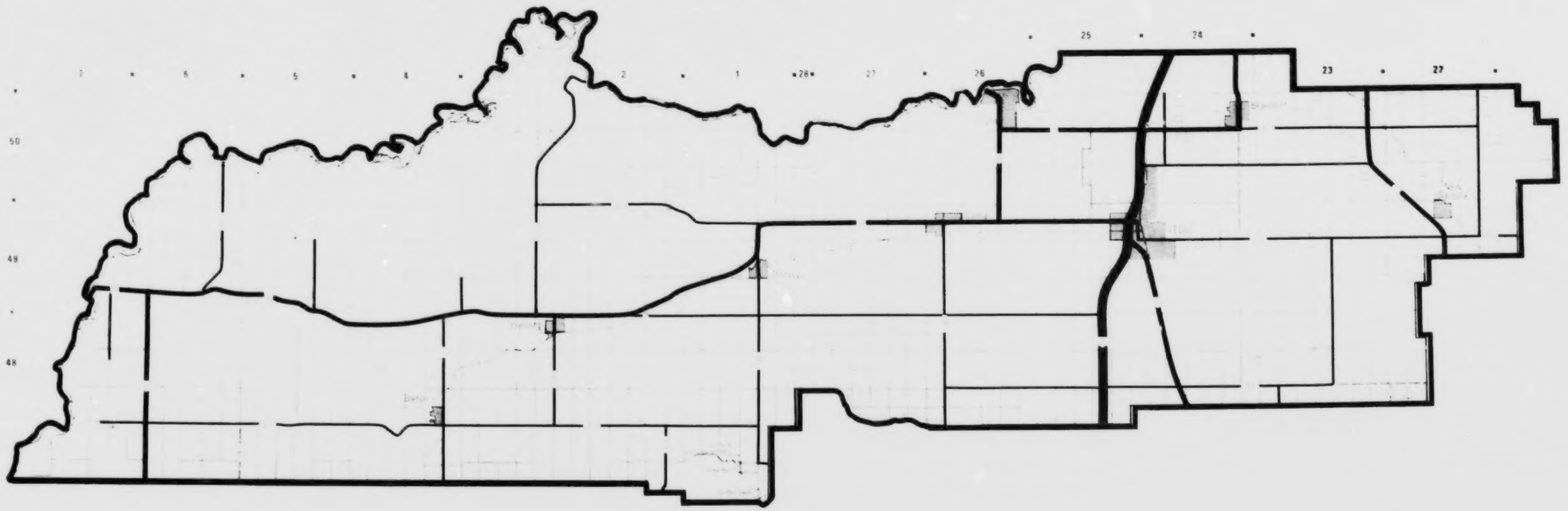

Rural Freeway / Expressway (10,000+ AADT)

Rural Arterial (2,000-9,999 AADT)

Rural Collector (200-1,999 AADT)

NOTE: All roadways not otherwise classified, function as local roads with less than 200 AADT.

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MAP 4

EXISTING ROADWAY CLASSIFICATION

III. POPULATION, EMPLOYMENT AND LAND USE

1. Population and Employment

The 1985 population of the study area is estimated at 37,200. The 13,300 residents of the County of Leduc are dispersed on farms, country residential subdivisions, and hamlets; overall, the population density of the County is less than 5 people per square kilometer. The remaining 23,900 people in the study area are residents of the eight urban municipalities which range in population size from about 500 (New Sarepta, Warburg and Breton) to almost 13,000 (City of Leduc). Three summer villages are also located in the study area, but their combined permanent population is very low.

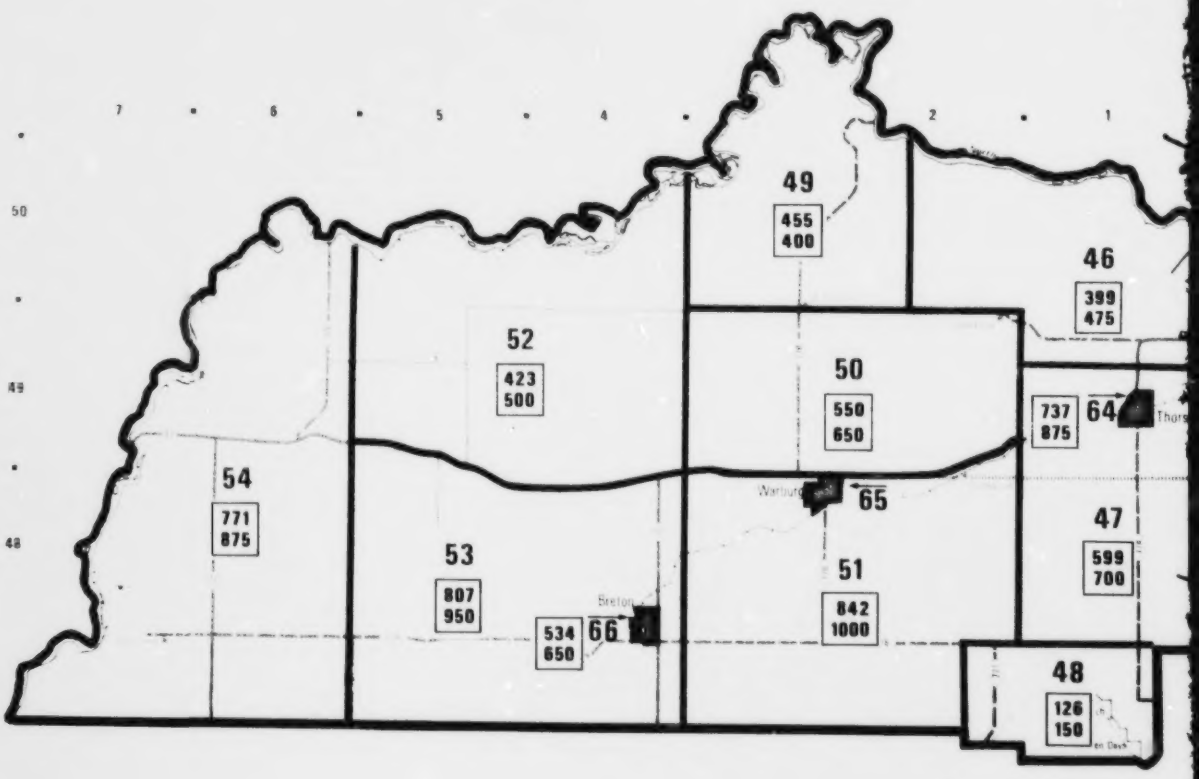
The study area population is projected to increase by 9,500 to a total population of 46,700 by the horizon year of 1995. About 75 percent of this increase is likely to occur within the urban centres with over 40 percent projected within the City of Leduc. This will result in a County of Leduc population of about 15,700 in 1995 and a combined population of 31,000 in the urban centres.

Map 5 shows the current and projected population distribution for the 8 urban and 21 of the 23 rural transportation zones. These zones were established for the purpose of developing a transportation model to project future travel patterns and volumes.

The values shown on Map 5 for the two remaining rural zones (i.e. Zone 35 - Nisku Industrial Park, and Zone 40 - Edmonton International Airport) represent estimates of present and future employment. The resident population in these zones is low but, together, they provide an estimated 6,700 full time employment opportunities. By 1995, employment for these areas is estimated to be 13,300. Thus, employment in these zones, rather than population, will be the major determinant of future travel behaviour. For this reason, employment values, instead of population figures, are shown for Zones 35 and 40 and were used in the transportation model.

2. Land Use

The study area contains a diverse mixture of land uses. The predominant land use, in terms of the area occupied, is agriculture. About 1900 farms occupy approximately 276,500 hectares of land in the County. Interspersed within the farming areas are a number of small hamlets which generally offer limited commercial services to the local population and may also contain some community facilities, such as a church, school or community hall. The small urban centres of Breton, Warburg, Thorsby and Calmar perform a more extensive service centre function for the large agricultural area in the western part of the County. The key transportation facility serving these communities is Highway 39.



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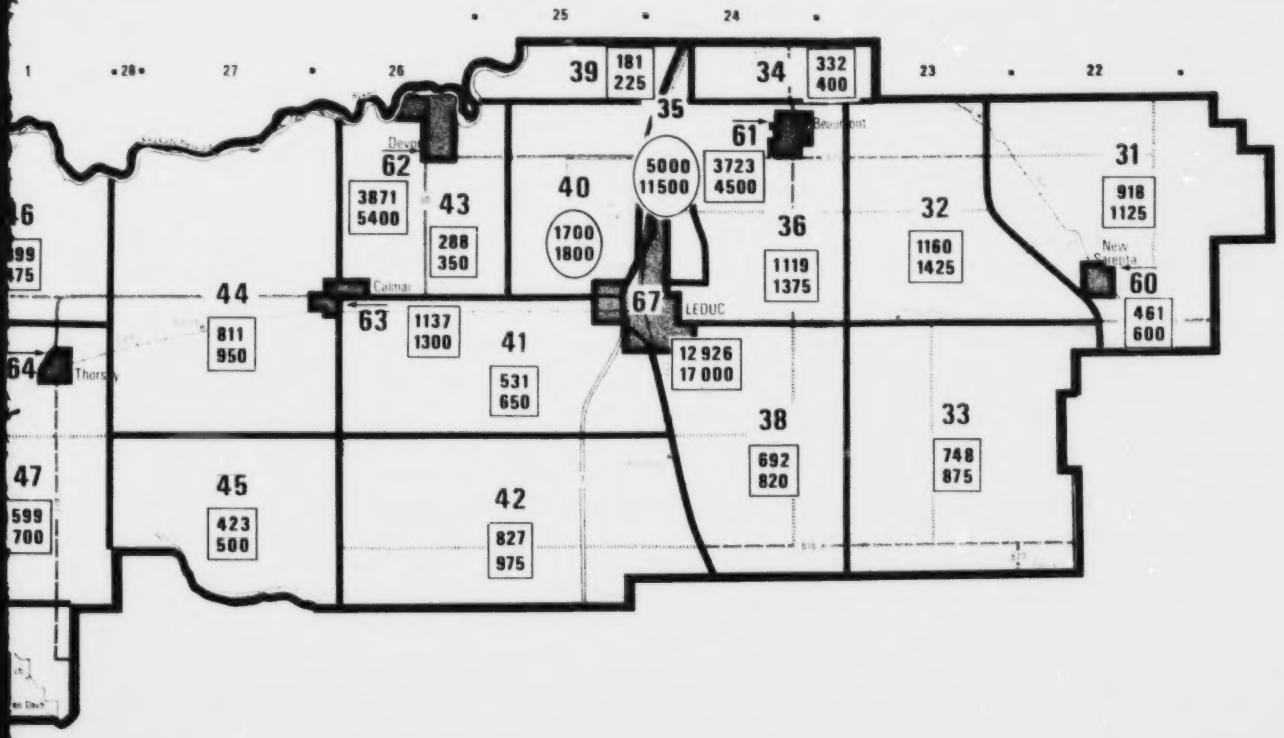


67 Transportation Zone

748 / 875 1985 Population / 1995 Population

1700 / 1800 1985 Employment / 1995 Employment

MAP 5

POPULATION OR EMPLOYMENT BY TRANSPORTATION ZONE

Country residential land uses tend to be clustered in the north-east portion of the County, in proximity to major urban areas or to employment opportunities in the rural area. The residents of the country residential areas tend to expect transportation services at a higher, more urban standard than do the more traditionally rural residents.

A number of areas, such as Jubilee Park, the Rabbit Hill Ski Area and the cottaging and summer village areas around the north shore of Pigeon Lake, offer recreational opportunities which attract residents from the entire metropolitan area.

Also scattered throughout the County, often in relatively isolated locations, are a variety of rural industrial and utility land uses. These include agricultural industries, such as seed cleaning and fertilizer plants, gas plants, sand and gravel extraction sites and landfill sites.

A major new power plant is under construction in the Genesee area. Associated with the plant is an extensive coal mining area. Several local roads have been closed to accommodate the mining area and cooling ponds. Construction of new roads to maintain access to private property in the area, has been, and continues to be, negotiated with Edmonton Power. The full impact of the construction and operation of the power plant on the roadway system, particularly in the western part of the County, remains to be seen.

The dominant element of the study area's land use pattern is the intense node of urban and industrial development along the Highway 2 corridor. This corridor houses a disproportionate amount of the study area population and contains the most significant concentration of employment opportunities.

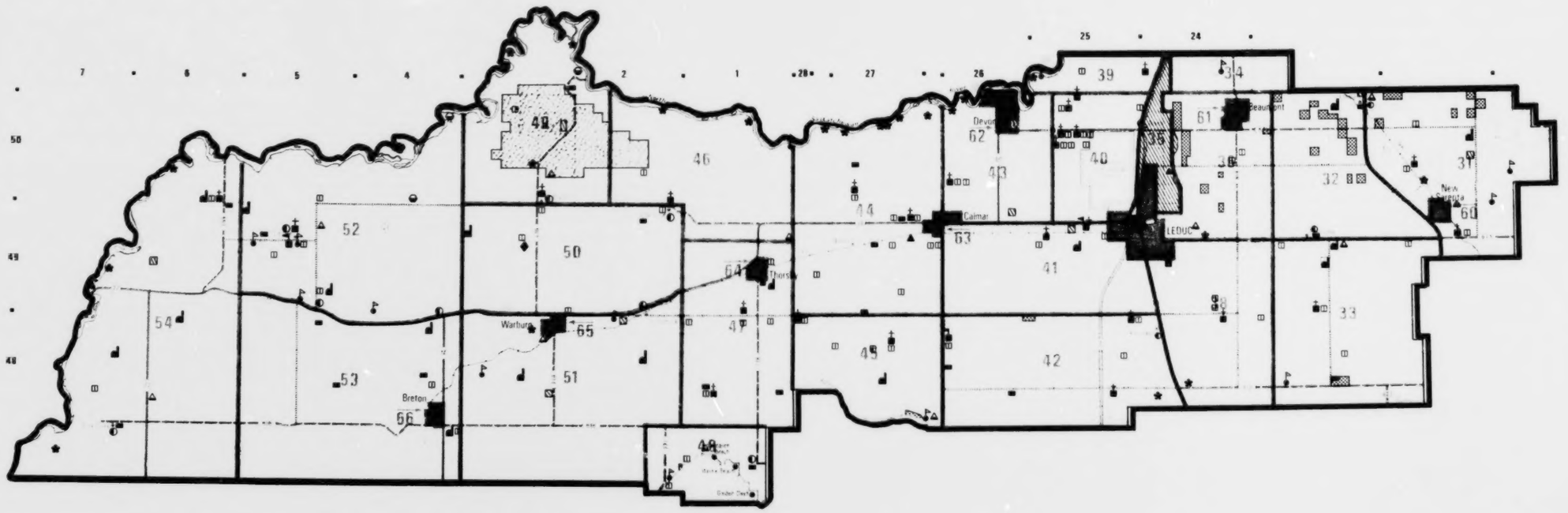
Map 6 illustrates the existing land use pattern in the study area.

3. Transportation Impacts

The population and employment distributions, along with the pattern of land uses, operate in concert to produce a number of impacts on travel patterns and the roadway network.

The study area lies in the path of the dominant provincial traffic flow along the Edmonton/Calgary corridor. The highest traffic counts in the entire province are recorded on Highway 2 just north of Leduc. About 70 percent of the study area population lies within 13 km of Highway 2. This proportion is projected to increase slightly by 1995.

Within the study area, the major focus of travel is the Airport/ Nisku/Leduc area. Together, these locations will account for about 56,000 trips of a total of 198,000 in 1995, or approximately 28 percent. The remaining urban centres will account for over 25,000 trips, or a further 13 percent. Travel associated with the rural areas west of Highway 2 (except for the Airport) is more or less equally distributed, with the only discernible focuses being Nisku and the City of Leduc.



- General Urban
- Country Residential
- Rural Industrial
- Heavy Industrial
- Agricultural
- 67 Transportation Zone
- Hamlet
- Summer Village
- Locality
- Hutterite Colony
- Commercial
- Institutional
- Community Hall
- School
- Church
- Church with School
- Cemetery
- Recreation
- Gas Plant
- Sand and Gravel Extraction
- Utility Site
- Land Fill / Transfer Site

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MAP 6

EXISTING LAND USE

Transportation planning and the operation of the County's roadway system should consider:

(a) the importance of the Highway 2 corridor in provincial and regional traffic flows;

(b) the critical role played by Highway 39 as an east-west corridor serving long distance, inter-municipal travel movements;

(c) the importance of Highways 21 and 22 in serving long distance, north-south inter-municipal travel demands;

(d) the overall importance of joint transportation planning because of the County's strategic location, its multiple interfaces with other municipalities and the presence of several regionally important traffic generators, such as Pigeon Lake and the Genesee power plant. Road improvements in one jurisdiction impact on other jurisdictions and travel demands originating in other jurisdictions place demands on the County's roadway system;

(e) the need to provide access to all property, regardless of the overall density of development. It should be expected that some roadways will carry only low volumes of traffic. This fact alone should not belie the importance of roadways such as, for example, school bus routes or farm to market access routes from the agricultural community;

(f) the more extensive maintenance needs, due to increased traffic volumes and heavy truck travel, which result from the presence of certain rural industrial land uses, such as gas plants, landfill sites and sand and gravel operations in isolated or semi-isolated locations; and

(g) the present uncertainty of the spin-off effects which the development of Genesee may have on the roadway system.

IV. COUNTY OF LEDUC RECOMMENDED TRANSPORTATION PLAN

This section of the report identifies future roadway requirements for the County of Leduc, by functionally classifying particular roadways as rural freeways/expressways, rural arterials, rural collectors or local roadways. Map 7, Recommended Roadway Plan, establishes a logical, integrated system of roadways for the long term planning horizon beyond ten years. It provides a framework for the more specific recommendations which follow. Based on this functional classification of principal roadways, design criteria can be established and applied. This will assist in short term planning and decision-making with respect to such matters as right-of-way acquisition, land use and development.

The following chart summarizes the key elements of the long term plan, and provides a suggested order of priority. The priorities are based on a 3 point scale, with priority 1 relating to the 1986 to 1990 period, priority 2 to the 1991 to 1995 period, and priority 3 to the period beyond 1995.

CHART 1: RECOMMENDED ROADWAY IMPROVEMENT PROGRAM

Primary Highways

1. Upgrade Highway 19 and Highway 60 north of 19 to function at a rural freeway/expressway standard to accommodate the traffic increases associated with the growth of Devon and a west Edmonton bypass function. (Priority 3).

2. Designate SR 625 as a primary highway (Highway 19) or a 900 series secondary road. (Priority 1).

   (a) Upgrade the portion from Highway 2 to the 91 Street extension to rural freeway/expressway standard. (Priority 3).

   (b) Upgrade the portion from the 91 Street extension to Highway 21 to rural arterial standard to complete the south and east Edmonton bypass route. (Priority 3).

Secondary Roads

3. Upgrade SR 623 to function at a rural arterial standard. (Priority 2).

4. Designate the Sunnybrook - Kavanagh Road as SR 617. (Priority 1).

   (a) Upgrade this roadway to SR 209[1] standard to connect with Ord Lake Road. (Priority 2).

   (b) Extend the recommended SR 617 alignment east from Ord Lake Road to connect with the existing SR 617 at Highway 21 near Hay Lakes. (Priority 3).

5. Extend the SR 814 designation south along Ord Lake Road to SR 616.

   (a) Upgrade this extension to RCU 209[1] standard. (Priority 1).

---

1. This standard, as used here, refers to a right-of-way width of 40 metres.

CHART 1: continued

(b) Continue the SR 814 designation south of SR 616 along the local road west of Coal Lake to connect with Highway 13 near Wetaskiwin. (Priority 2).

6. (a) Complete the paving of SR 616. (Priority 1)

(b) Ensure clear signage of local access roads south from SR 616 to the various resort developments around Pigeon Lake. (Priority 1).

(c) Examine the feasibility of developing a more continuous alignment for SR 616 through the County of Leduc. (Priority 3).

7. (a) Complete the paving of Airport Road. (Priority 1).

(b) Upgrade Airport Road to a secondary road standard. (Priority 3).

County Main Roads

8. (a) Upgrade St. Francis Road West and Mobuck Road to high standard gravel roadways. (Priority 1).

(b) Locate signs at key locations identifying: i) Mobuck Road as that County main road facility extending east 8 km (5 miles) from SR 759 and south to Highway 39; and ii) St. Francis West Road as that County main road facility extending west from the intersection of SR 770 and SR 622 for 19 km (12 miles) and then south to connect with Mobuck Road. (Priority 1).

(c) The County should continue to monitor the need for a secondary road in this general area, to serve as an east-west connection between SR 759 and SR 770.

Local Roads

9. Upgrade the local road north of the new location of SR 761 and between SR 616 and Highway 39 to function as a collector when SR 761 becomes established as a park access to the proposed Buck Lake provincial park. (Priority 3).

Special Access Roads

10. Construct the southerly extension of 91 Street in Edmonton to a rural freeway/expressway standard in the County of Leduc to carry commuter and industrial truck traffic, and to function as a major link between the Whitemud Freeway and the existing SR 625. (Priority 3; see also Recommendations 11 and 12).

CHART 1: continued

11. The County of Leduc recognizes that certain land uses result in travel volumes and types of traffic on segments of roadways that generate a need for more than the usual level of maintenance to maintain a satisfactory roadway condition. These roadways are identified as Special Access Roads on Map 8, and their condition will be carefully monitored to determine the need for upgraded roadway standards.

External Linkages

12. Several factors, related to the regional transportation system and to linkages with multiple jurisdictions, are beyond the scope of a municipal roadways plan and should be resolved on a regional/inter-municipal basis. These include, but are not limited to:

    (a) further evaluation of connections between Edmonton City and the County of Leduc, and the selection and endorsement of a long term strategy;

    (b) the long term objective of completing a southern and eastern bypass through the eastern extension of Highway 19 to connect with Highway 21, which already exists as a high standard north-south facility;

    (c) the need for an improved connection between Joseph Lake Road and Highway 14 in the County of Strathcona;

    (d) the need for additional crossings on the North Saskatchewan River; and

    (e) the need to address the transportation of dangerous goods on a regional basis.

    (Priority 1)

Maintenance

13. (a) The County is encouraged to continue to improve its roadway maintenance program. The following basic elements should be included in the program:

        (i) a complete listing and grouping of all maintenance activities;

        (ii) the development of standards for these maintenance activities in order to limit the rate of roadway deterioration and to assist in setting maintenance priorities;

        (iii) a comprehensive recording and reporting system which communicates such information as location and type of maintenance activity, manpower and equipment utilized and time required; and

CHART 1: continued

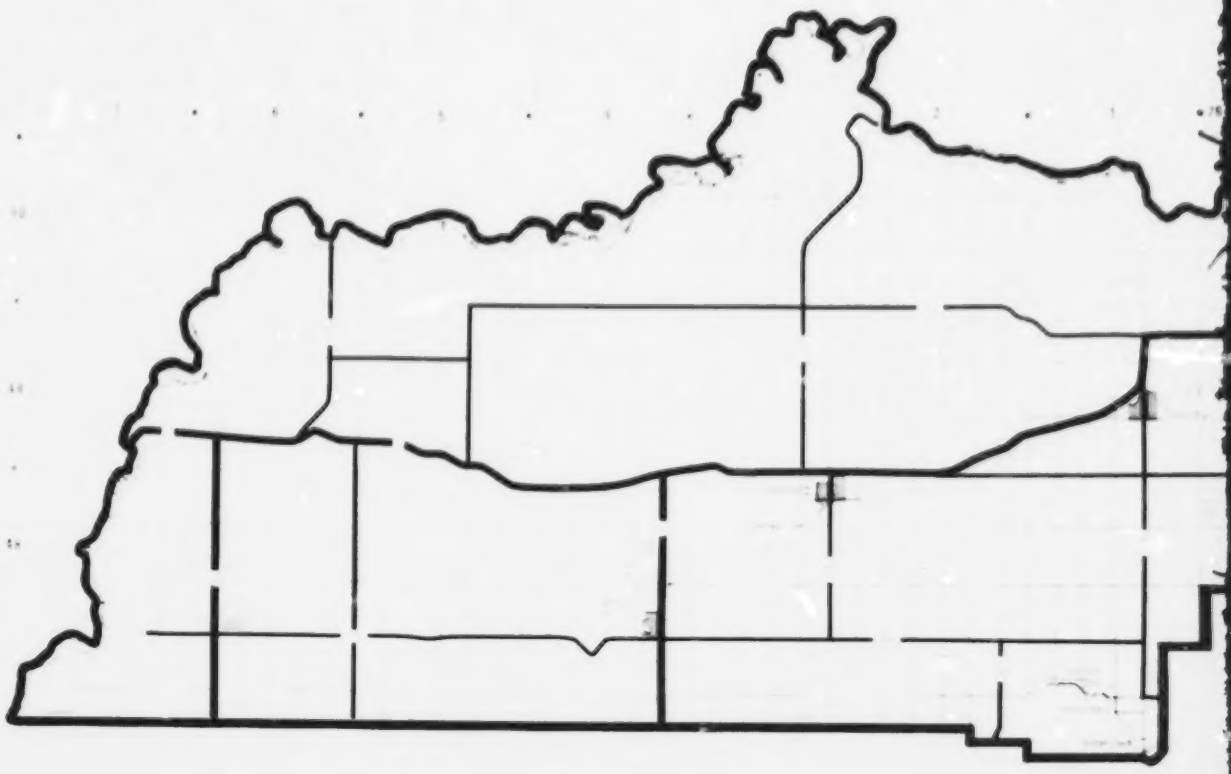
(iv) regular monitoring and evaluation of the maintenance reports to enable effective planning and control of maintenance work, and to assist in budgeting for maintenance and roadway improvements.
(Priority 1)

(b) In the interim, high maintenance roadways should be continuously monitored to determine the cost/benefit of continued maintenance versus an improvement in the standard of roadway.
(Priority 1)

14. The County should continue to seek and negotiate cost-sharing agreements with major roadway users for repair or upgrading if the user's scale of operation warrants and if such an agreement would result in benefits to the user in terms of a higher standard roadway and to the County in terms of lower maintenance costs. (Priority 1).

Relationship to Land Use

15. The County is advised to consider the foregoing recommendations and associated land use impacts in their decision-making with respect to subdivision and development, and in future preparation or review of their statutory land use plans and policies. (Priority 1)



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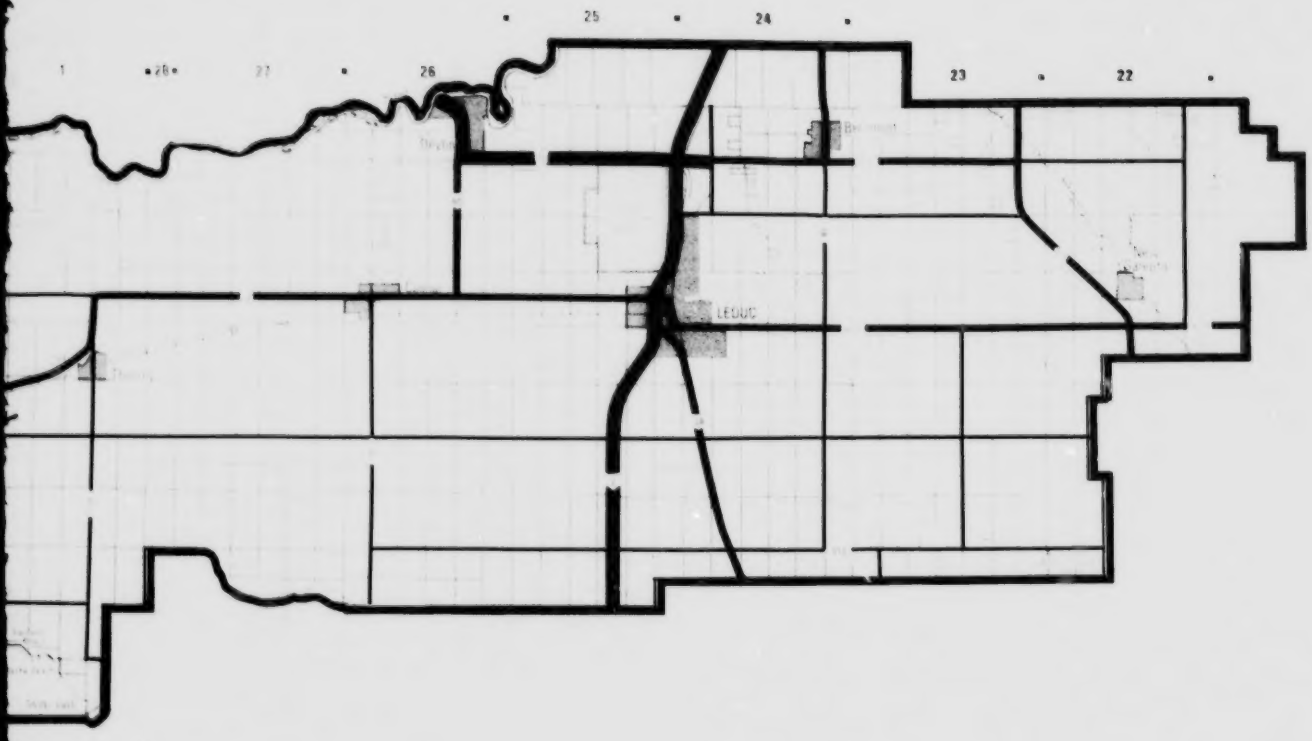


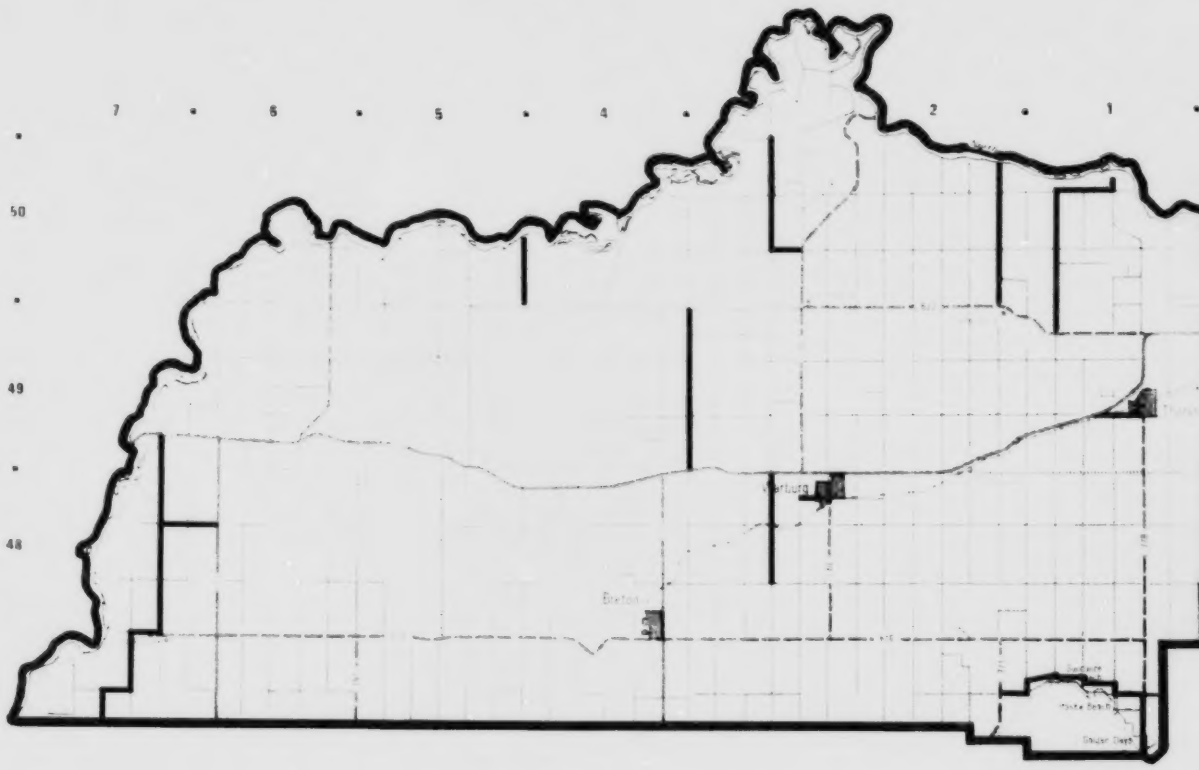
Longterm Roadway Classification

- Rural Freeway / Expressway
- Rural Arterial
- Rural Collector

NOTE: All roadways not otherwise classified, function as low volume local roads.

MAP 7

RECOMMENDED ROADWAY PLAN



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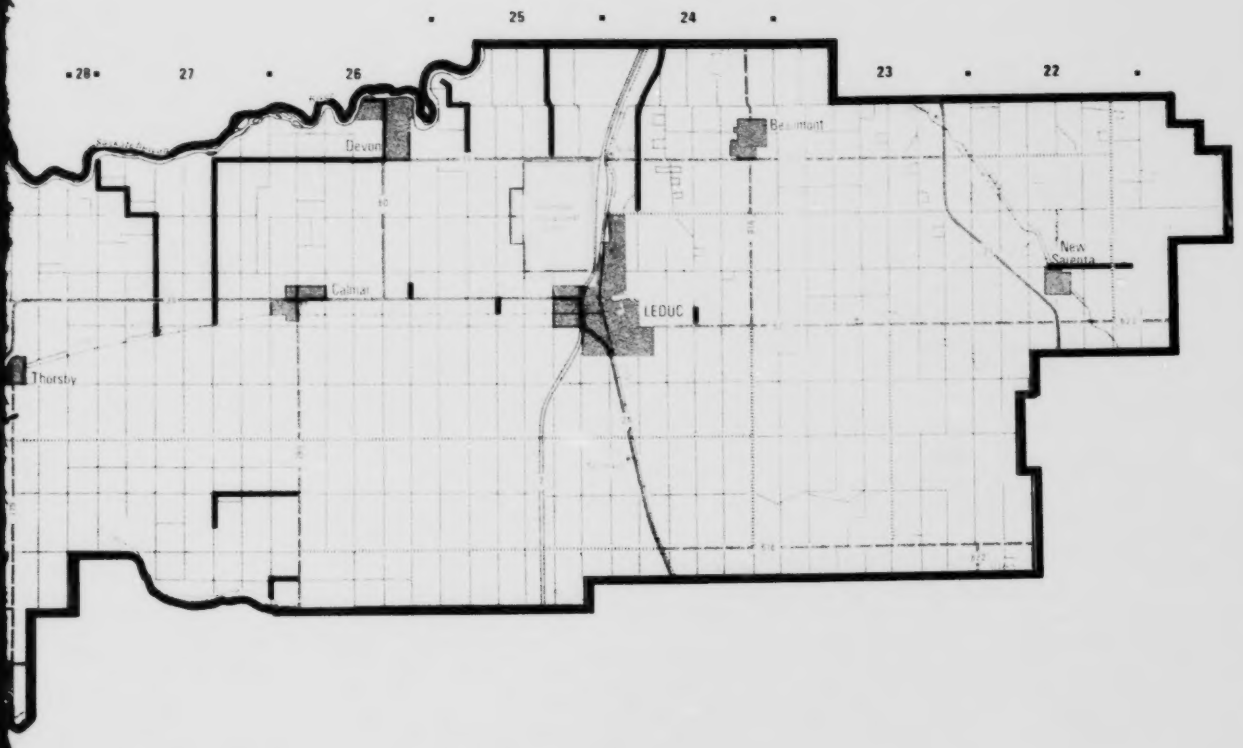

Special Access Road

MAP 8

SPECIAL ACCESS ROADS

Number/
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1

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Edmonton Metropolitan Regional Planning Commission

Background Report #1
Existing Conditions and Trends

Prepared by
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in co-operation with Battle River Regional Planning Commission
September 1986

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I. INTRODUCTION

Although the population of the County of Leduc has been stable over the last few years, renewed economic activity in the region is expected to increase the County's population and employment base. The County of Leduc recognizes that increased population and employment opportunities will increase the demands upon the existing infrastructure, and may require new services and facilities. It is therefore important to design a rural road network which will assist the municipality in developing and maintaining a safe, convenient, efficient transportation system for the movement of people, goods and services between major origin and destination points.

For the purposes of this study, the term "rural roads" includes secondary roads, county main roads and local municipal roads. A review of the primary highway system will be included to examine road system continuity and/or specific roadway links.

In response to the County of Leduc's request for assistance, the Edmonton Metropolitan Regional Planning Commission (E.M.R.P.C.) and the Battle River Regional Planning Commission (B.R.R.P.C.), initiated this comprehensive rural road system study.

Completion of this study will assist the County of Leduc by:

1. providing a transportation plan for consideration as County policy and as an aid to discussions with provincial departments;

2. providing a mechanism for determining priority requirements for roadway construction and reconstruction;

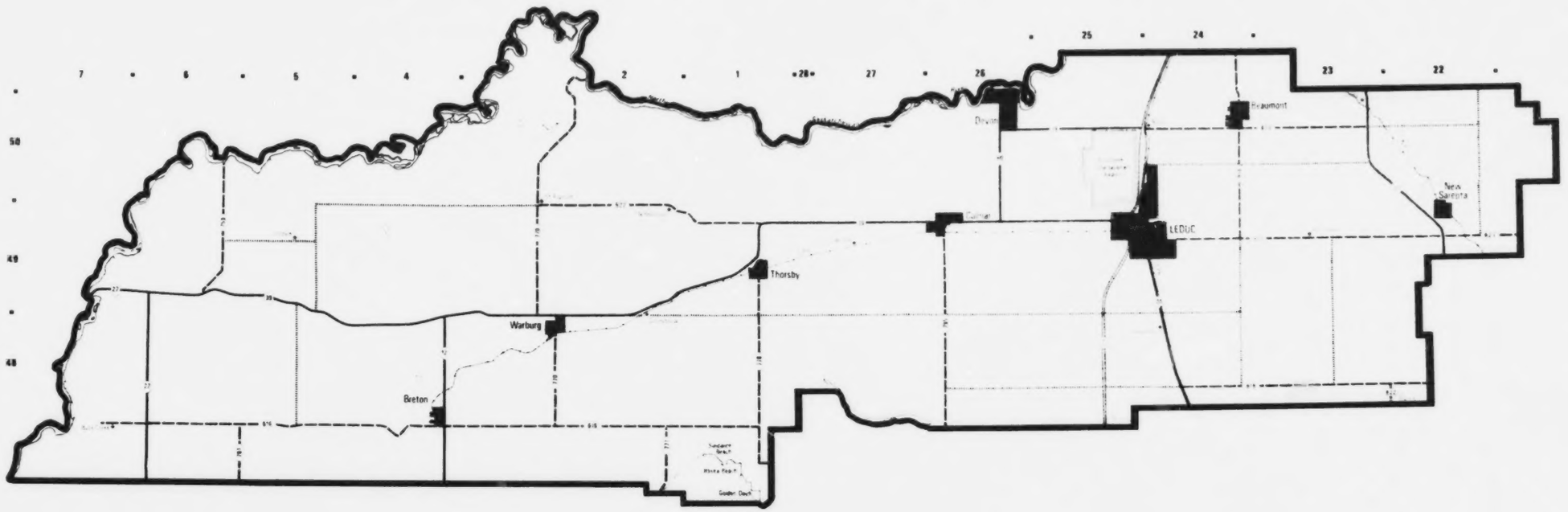
3. providing information required to document the need for future secondary road reclassification requests to Alberta Transportation; and

4. ensuring that basic transportation services within the municipality are provided now and in the near future at an acceptable level of service and within the financial capabilities of the County.

1. Study Area

The study area is defined as the lands within the boundaries of the County of Leduc No. 25. The County includes over 3,400 kilometres of roads and contains an estimated 1985 population of 13,296 residents. In addition, all urban centers within the County have been included in the study area and these contain a 1985 population of nearly 24,000. The City of Edmonton, Drayton Valley and other urban centers on the periphery of the study area have been reviewed and considered in order to prepare travel demand forecasts. Map 1 identifies the study area.

COUNTY OF LEDUC **Rural Road System Study**



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MAP 1

STUDY AREA

2. Study Procedure

This study is being conducted by the Edmonton Metropolitan Regional Planning Commission with technical support from the Battle River Regional Planning Commission, County of Leduc administrative and technical staff and Alberta Transportation.

Background Report No. 1, Existing Conditions and Trends, is the first in a series of reports which will outline detailed study results. Subsequent reports will address population and employment projections, transportation model formulation and calibration and finally the development of a recommended plan.

3. Transportation Zone System

As a first step, the study area was divided into twenty-four (24) internal transportation zones as shown on Map 2. The boundaries of these zones were developed jointly by E.M.R.P.C., B.R.R.P.C. and County staff. Wherever possible, the transportation zone boundaries respect census tract boundaries, topographical features, natural physical barriers to transportation, areas designated for future development and areas of homogeneous land use. External transportation zones will be established at a later date in order to analyze the impact of external traffic demands.

II. LAND USE

1. General

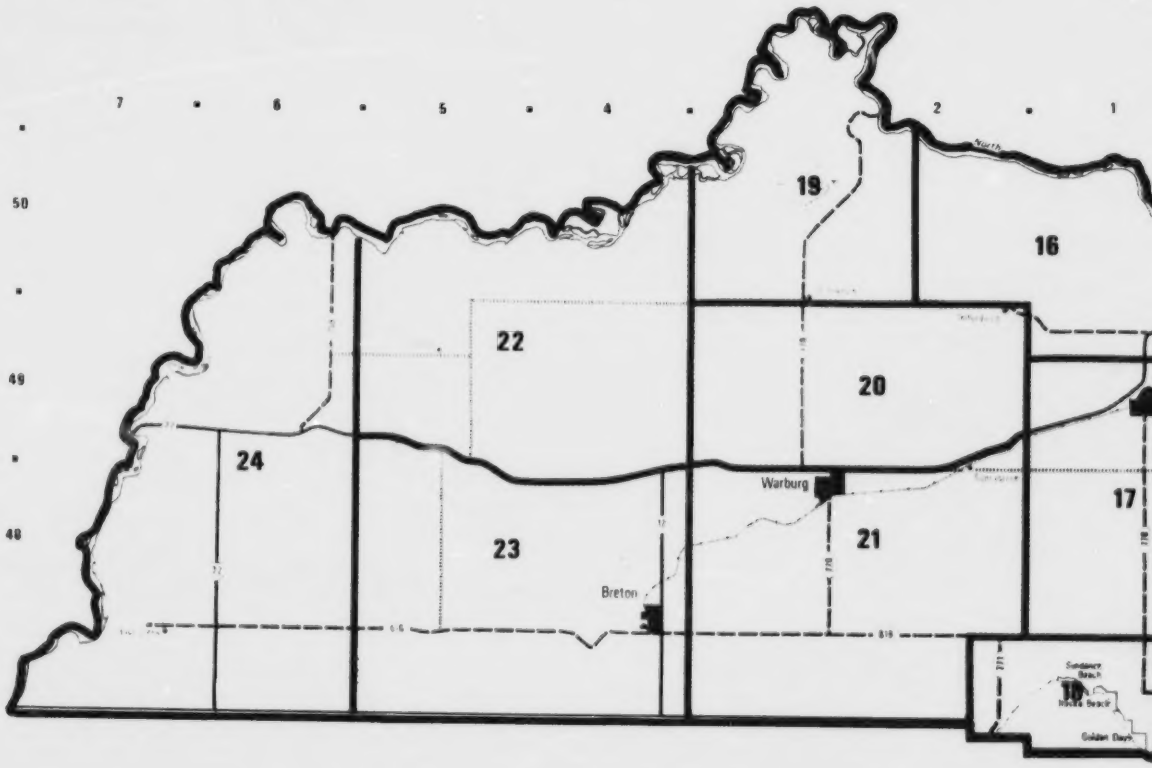
Land use is one of the determinants of future transportation requirements. The land use pattern identifies major traffic attractors and generators. It is necessary to identify the amount and distribution of both existing and future population and employment in order to determine the County's existing and future transportation requirements. It is then possible to define the type and timing of future rural road requirements including improvements to the existing road system.

2. Existing Land Use Pattern

Existing land use is illustrated on Map 3. Appendix 1 identifies the major land uses, topographical features, urban centres and the County land use by-law designation for each transportation zone.

The principal land use in the County of Leduc is agriculture. In 1981, the total farm area was 276,500 hectares with a total of 1,900 farms.

Other major land uses in the County include country residences, commercial and industrial development, oil and gas resource facilities and transportation and utilities infrastructure. Associated



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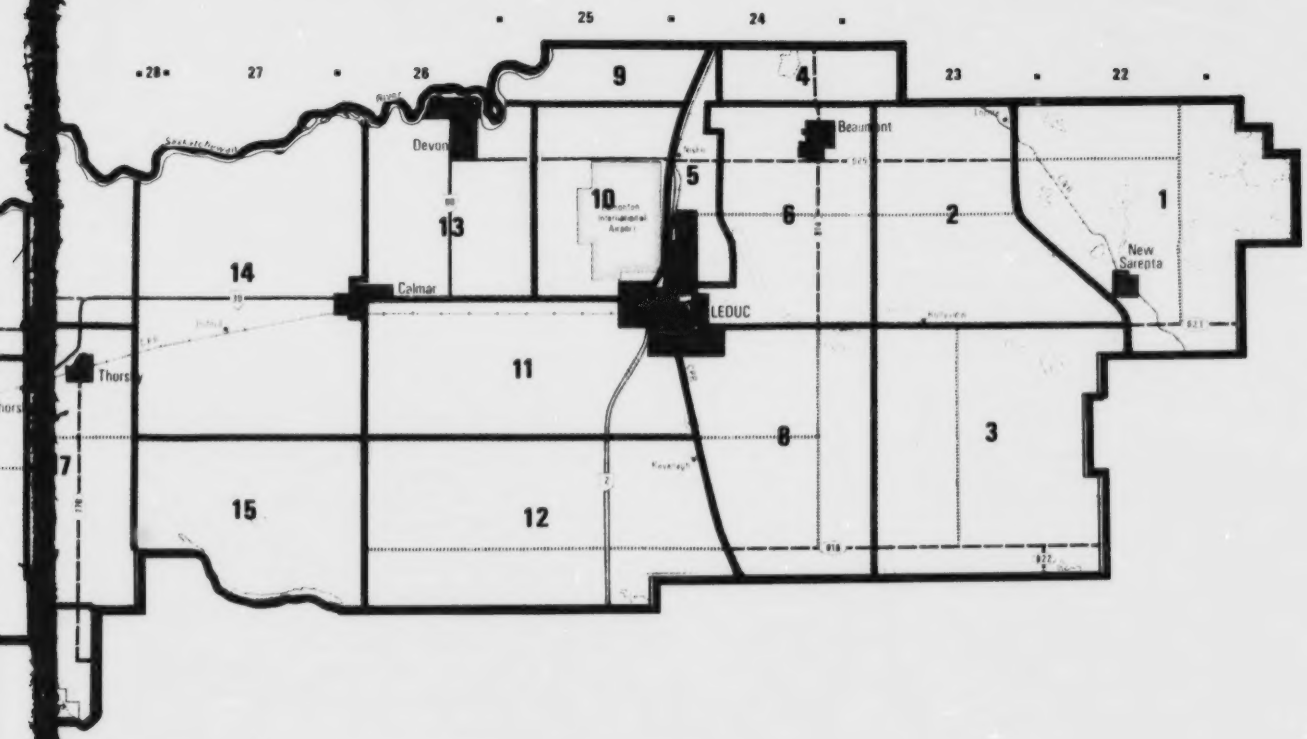
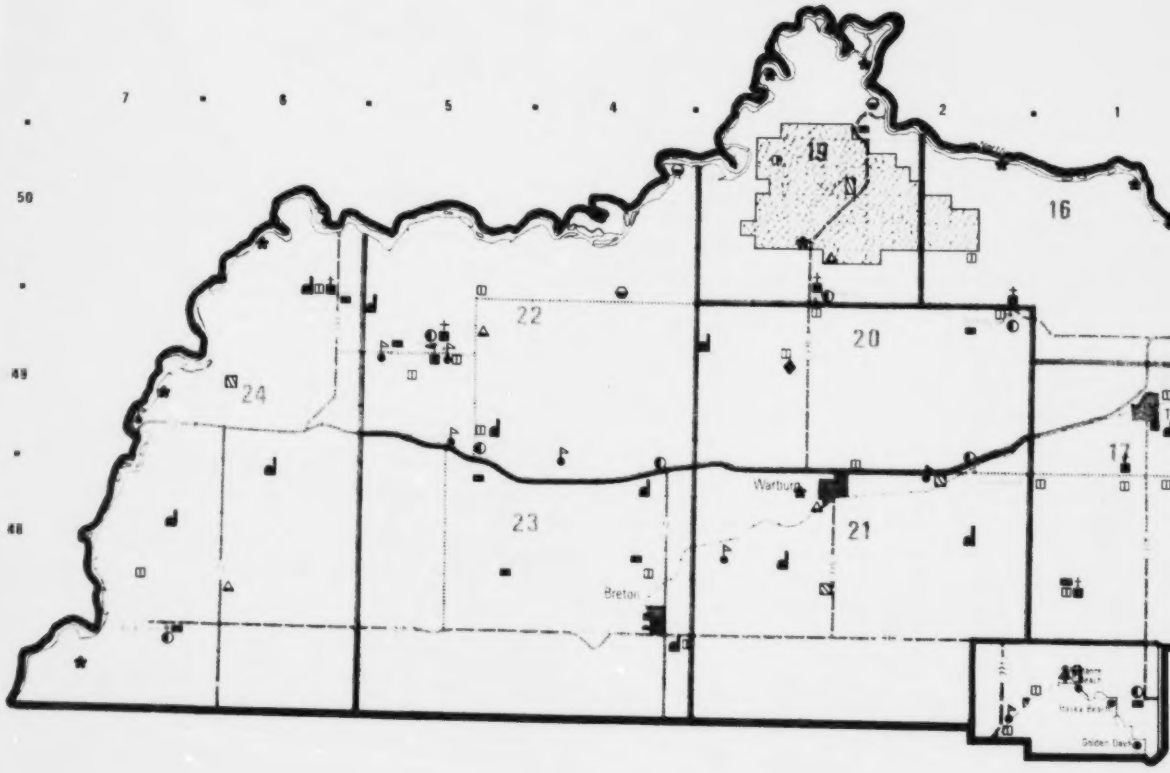


24 Transportation Zone

MAP 2

TRANSPORTATION ZONE SYSTEM



- General Urban
- Country Residential
- Rural Industrial
- Heavy Industrial
- Agricultural
- 24 Transportation Zone
- Hamlet
- Summer Village
- Locality
- Hutterite Colony
- Commercial

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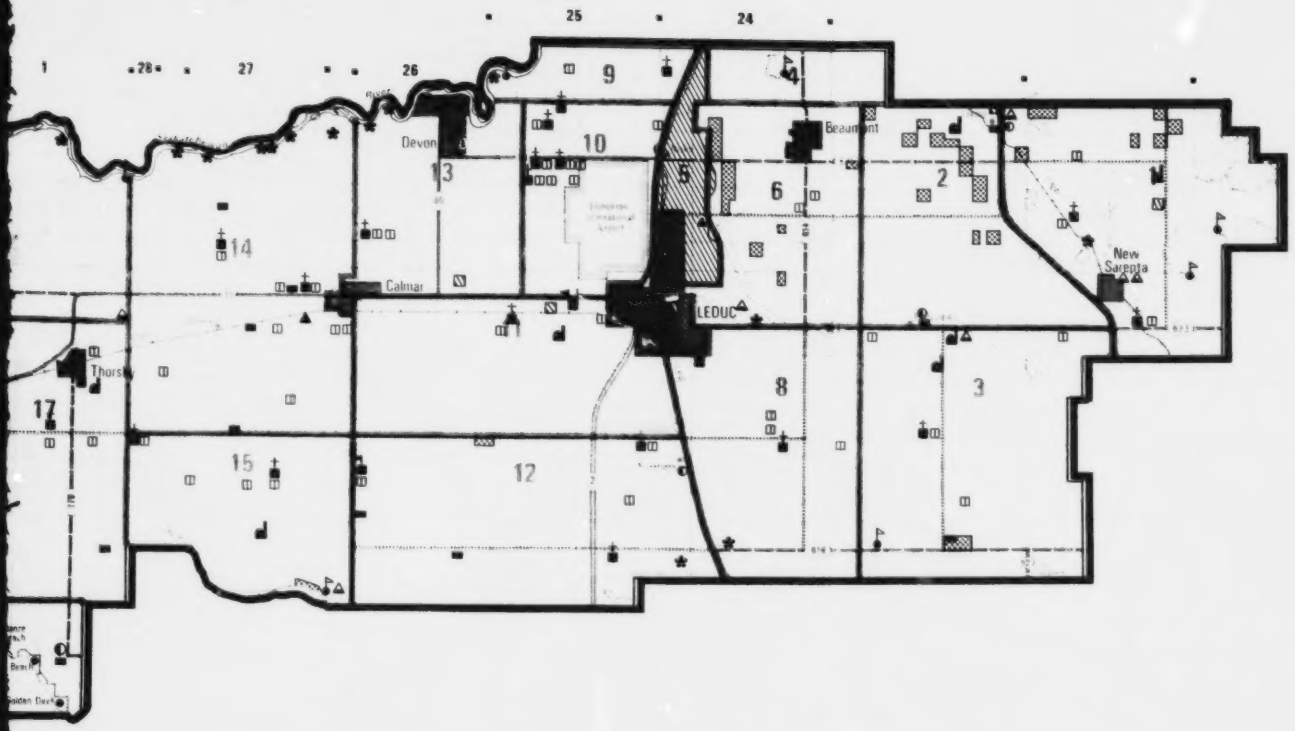

- Institutional
- Community Hall
- School
- Church
- Church with School
- Cemetery
- Recreation
- Gas Plant
- Sand and Gravel Extraction
- Utility Site
- Land Fill / Transfer Site

MAP 3
EXISTING LAND USE

986

5-3

with the numerous hamlets and resort areas are a variety of public and institutional uses such as community halls, churches, cemeteries and schools.

The residential, commercial and industrial land uses concentrated in the towns, villages and the City of Leduc are a significant element in the study area's land use pattern.

3. Regional Context

The County of Leduc is bounded by the City of Edmonton to the north, the largest urban centre in the region and the focus of rural travel patterns for "higher order" goods and services and employment opportunities (see Map 4). The County also shares parts of its boundary with five counties (Strathcona, Beaver, Camrose, Wetaskiwin, Parkland) containing numerous cities, towns and villages in proximity to the County of Leduc. Travel patterns in the County are influenced by the numerous urban centres, recreational areas, and other land uses both within and on the periphery of the study area. Recognizing these external land use influences on the County of Leduc aids in understanding travel patterns and trip purposes. Rural travel patterns are primarily influenced by travel from farm to market and to a lesser degree by rural residential and industrial development, recreation, and commuting to urban centres. Market centres tend also to be the location for social, shopping and recreation activities.

Recognizing the external roadway connections with primary highways, secondary roads and some rural roads provides a provincial and regional context to the County's roadway system.

III. RURAL ROAD NETWORK

1. Existing Rural Road Network

For transportation planning and design purposes, roadways are most easily and effectively classified by function. It is important to have a functional classification defined for all principal roadways in the County so that design criteria can be established and applied to encourage the use of the roadway as intended. Design features that convey the level of functional classification to the driver include: width of roadway, continuity of alignment, spacing of intersections, frequency and location of driveways, building setbacks, grade standards and traffic controls.

For the purposes of this study, roadways within the County are classified as follows: rural expressway/freeway, rural arterial, rural collector and local roadway. An overview of the typical characteristics of these various roadway categories can be found in Appendix 3 of this report. These roadway categories have been used to classify the existing road network and will be used later in the study to determine the recommended transportation system requirements.

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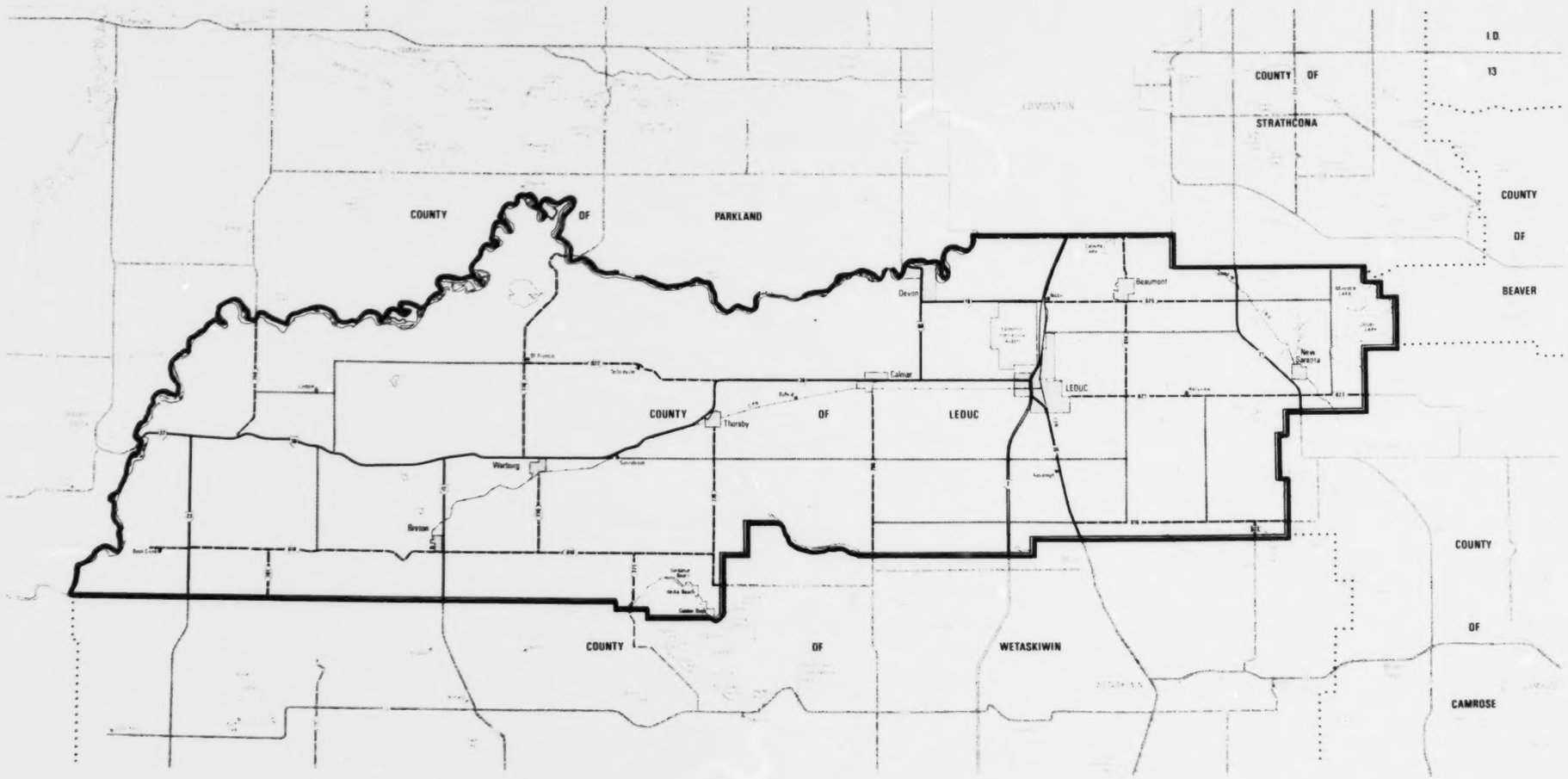

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NOTE : Portions of the Sec. Rd. 761 alignment in the County of Wetaskiwin are not presently constructed to secondary road standards. A proposal exists to move the alignment west to function as a park road into Buck Lake.

MAP 4

REGIONAL CONTEXT

The County has an existing road network made up of primary highways, secondary roads, county main roads and local municipal roads. Maps 5 and 6 identify this network.

The following review of the rural road network will examine the major characteristics of each class of road and inventory the road system function performed by individual road links.

2. Primary Highways

The County of Leduc is generally well served by eight paved primary highways. These facilities are currently designed as rural arterial facilities with the exception of Highway 2 which is designed at a higher classification of rural expressway.

Rural expressways are built to accommodate the movement of large volumes of traffic at higher speeds under free-flow conditions (traffic flow should be uninterrupted and unrestricted). Rural expressways connect the larger cities, industrial concentrations and recreational areas. They also serve larger international and inter-provincial travel movements.

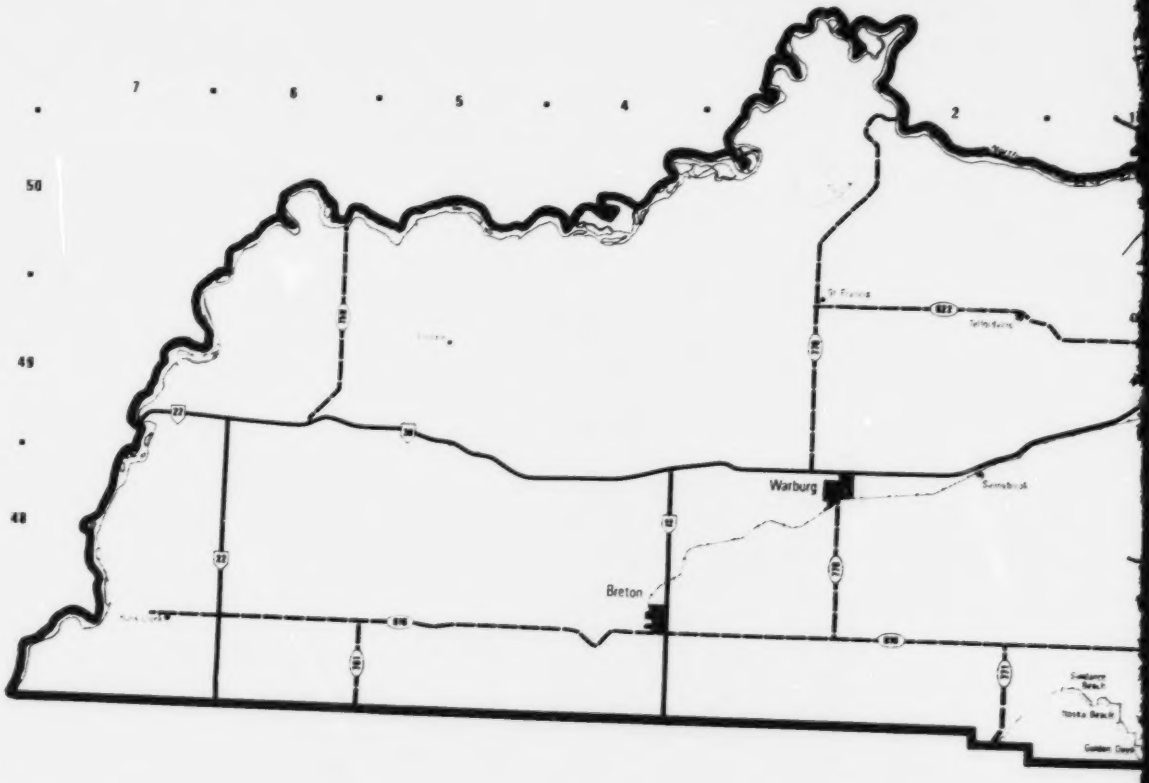
Rural arterial roads are intended to move large volumes of traffic at high speeds. The major distinction between this class and the rural expressway class is in the degree of control of access. Rural arterial roads, together with freeways, serve as major routes in a road network connecting the major economic regions and centers such as large cities, industrial concentrations, agricultural areas and recreational facilities. Rural arterial roads should be designed for uninterrupted flows of traffic except at controlled intersections with major crossroads. Rural arterial roads will generally make up 5 to 10 percent of the total rural road mileage and carry from 40 to 70 percent of the total traffic.

Primary highways are under full provincial jurisdiction for their planning, development and funding.

The designated primary highways in the County of Leduc are identified as follows:

(a) Highway 2 is the only multi-lane facility in the County of Leduc. It is built to a four lane divided rural expressway standard south of the City of Leduc, and widens to a six lane divided expressway north of the City of Leduc for most of the distance into the City of Edmonton. The Edmonton-Calgary corridor is the main transportation axis of the province, and carries corresponding larger volumes of traffic.

(b) Highway 2A, south of the City of Leduc is important as an inter-centre transport route to east-central Alberta as well as for its ancillary role to Highway 2. At present, Highway 2A is paved at a two-lane rural highway standard.



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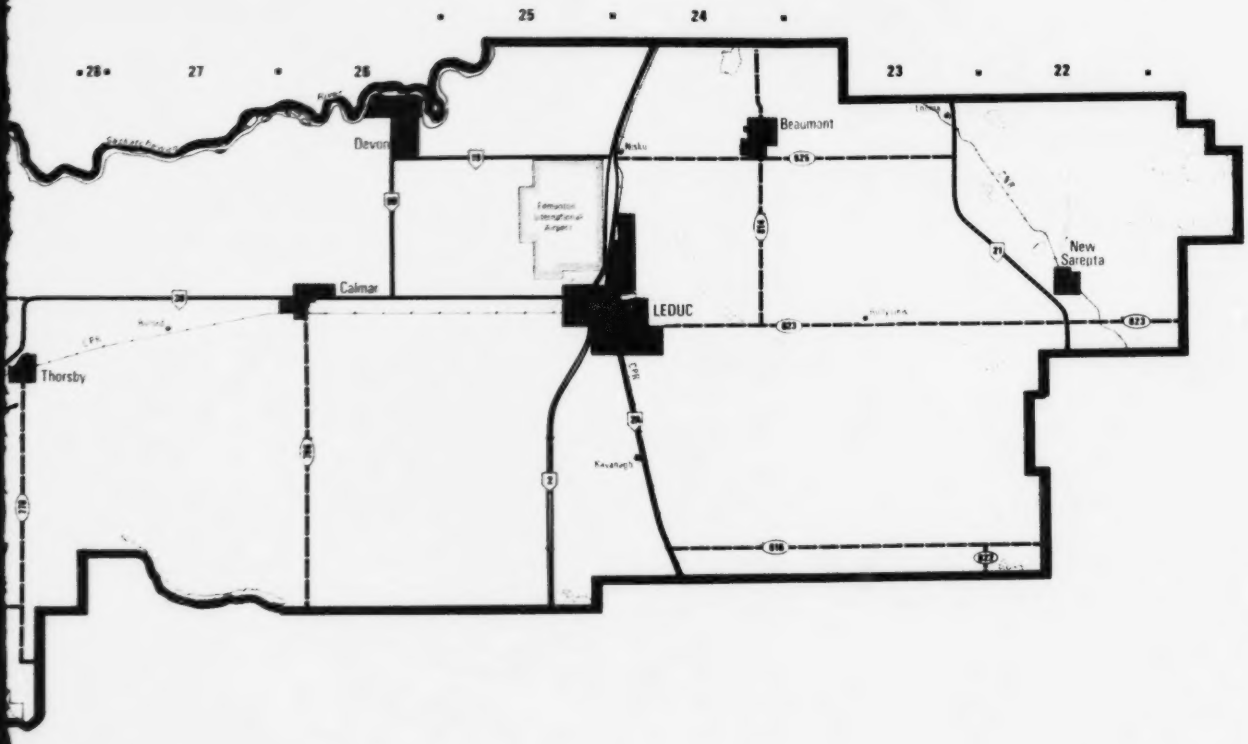


Primary Highway

Secondary Road

MAP 5

PRIMARY HIGHWAYS AND SECONDARY ROADS

(c) Highway 12, south of Highway 39, at Alsike is an important north-south road linking agricultural centers west of Highway 2. Traffic volumes are less than 2,000 vehicles per day with vehicle composition made up of private vehicles and a high percentage of trucks. This paved facility is built to a two lane rural highway standard.

(d) Highway 19 is located north of the Edmonton International Airport and runs east-west between Highway 60 and Highway 2. This facility operates at a rural two lane paved highway standard and serves as a south-western bypass of the City of Edmonton.

(e) Highway 21 functions as a rural arterial, running in a north-south direction between the County of Strathcona and the County of Camrose and connecting with the Trans Canada Highway in the southern part of the province. Highway 21 provides regional access, and for the most part, is currently constructed to a two lane paved undivided highway standard. A small portion, south of the Airport Road junction has recently been improved to a three lane paved highway facility.

(f) Highway 22 is located in the south-western corner of the County. A short portion of the highway runs east-west to link with Highway 39, then turns in a north-south direction. This roadway serves to link the west side of the County with the Town of Drayton Valley as well as providing a link between the rural agricultural centres to the north and south of the County of Leduc. This facility is built to a paved two lane rural highway standard. On a provincial scale, Highway 22 is a major north-south route connecting to the Crowsnest Pass, but is constructed to variable standards throughout the route.

(g) Highway 39 is an important east-west link in the County. It performs an inter-centre role linking Highway 2 to the western portion of the County and to the County of Parkland and Drayton Valley via its connection with Highway 22. Highway 39 is constructed to a paved two lane rural highway standard.

(h) Highway 60 provides a direct link with Highways 19 and 39 as well as those in the County of Parkland. This highway is on an important truck route and is part of the south-western bypass of the City of Edmonton. This facility is constructed to a paved two lane rural highway standard, but is scheduled for twinning in the next year or two. A new bridge across the North Saskatchewan River is presently under construction and will be completed in 1986.

3. Secondary Roads

Complementing and expanding the function of the primary highways in the County of Leduc is a system of secondary roads (SR). The secondary road system is part of the provincial system. Secondary roads

are classified as rural collector roadways. They collect traffic from local roads and county main roads and distribute it to arterials and expressways, providing inter-community service and access to farm markets, recreation areas and rural areas.

Secondary roads generally follow the east-west, and north-south grid pattern which was established when the townships were originally surveyed. These roadways are sequentially numbered throughout the Province. In the County of Leduc secondary roads run west to east from SR 759 to SR 822 and south to north from SR 616 to SR 625.

Secondary roads are under municipal jurisdiction but the Province shares the responsibility for their planning and funding. Right of way acquisition, maintenance and operation are the responsibilities of the local taxing authority.

Twelve designated secondary roads are located in the County. These include:

(a) SR 759 is located in the north-western portion of the County and functions as a farm to market road linking rural traffic to higher order roadways (Highway 39 and Highway 22). SR 759 is presently being upgraded in terms of design standards but is a gravelled facility.

(b) SR 761 is a short roadway link south of SR 616. SR 761 provides access to the Buck Mountain Community Pasture (a public reserve area which adjoins the south-western portion of the County). This secondary road is gravelled and is on a narrow right of way used by local traffic only. The alignment is proposed to be moved three miles west, and to function as a park road to Buck Lake and will provide a connection to Highway 13 in the County of Wetaskiwin.

(c) SR 770 is a major north-south secondary road in the County running from SR 616 through the north-central area of the County. A segment of SR 770 north of Highway 39 to St. Francis is paved while the remaining portions are gravelled. The Village of Warburg is located mid-way along this road link. SR 770 provides major access to the Genesee Power Plant. The remaining gravelled portions are to be paved.

(d) SR 771 runs north-south adjacent to the west side of Pigeon Lake. This facility has been recently upgraded and realigned to run in a more continuous route and to provide a linkage for traffic from the west side of the lake to SR 616.

(e) SR 778 runs south of Thorsby to the northern boundary of Pigeon Lake. This paved two lane rural highway serves as a northern route to the Pigeon Lake recreation area as well as the adjoining agricultural area. This facility is constructed to a two lane paved highway standard.

(f) SR 795 runs south of Calmar to the east side of Wizard Lake. This facility is built to a two lane paved highway standard for a total length of 17.5 km. This roadway links Highways 39 and 13, and serves mainly as a farm to market road with some recreation traffic.

(g) SR 814 runs south of Edmonton through Beaumont to SR 623. This secondary road is an important north-south route to the east side of Highway 2. This facility is paved both north and south of Beaumont and performs varied road functions. This secondary is an ancillary route to Highway 2, and serves a commuting and inter-community service function.

(h) SR 822 is a short section of roadway (1.5 km in length) in the south-eastern corner of the County. This facility provides access to the County of Wetaskiwin and serves as a rural community access route. SR 822 is built to a two lane gravel roadway standard.

(i) SR 616 is a major east-west roadway providing access to the southern boundary of the County. The roadway serves mainly as a farm to market collector roadway intersecting with other highways and secondary roads, but also provide access east of Highway 2A to the Coal Valley Area of the County of Camrose. A major portion of this secondary road is gravelled with small portions paved near the Village of Breton and Buck Creek. A new segment of SR 616 has recently been constructed west of SR 778, north of Pigeon Lake and it provides direct access from Highway 22 to SR 778. SR 616 will be paved up to the existing paved portion west of Breton in 1986.

(j) SR 622 runs from St. Francis eastward to Highway 39 north of Thorsby. This gravelled roadway provides rural farm access and serves as a collector roadway providing access to Highway 39. This roadway accommodates truck traffic between Nisku and the Genesee area, associated with power plant construction.

(k) SR 623 runs east of the City of Leduc, 30.8 km to Highway 21 and to Miquelon Lake Provincial Park. This roadway serves to link the east side of the County with the City of Leduc and Highway 2. This facility is built to a paved two lane rural highway standard and serves as a farm to market roadway, as well as accommodating recreation and inter-community travel.

(l) SR 625 runs east of Nisku Industrial Park and connects with Highway 21. This roadway serves as a major access route to Nisku Industrial Park, as well as a south-eastern bypass of the City of Edmonton. This facility is built to a two lane paved highway standard for a total length of 19.8 km.

4. County Main Roads

Two administrative categories are used to distinguish essentially local roads from those roads which attract higher traffic volumes, serve as a more continuous route and perform a minor collector roadway function. This last class of roads has been identified by the County as county main roads. These roadways are generally gravelled and provide inter-community service by chanelling local traffic and distributing it to other county main roads, secondary roads and, in some cases, primary highways.

The ten county main roads do not follow an established grid pattern but are identified by the county administration on the basis of local need and travel patterns. They are identified on Map 6.

County main roads are under full municipal jurisdiction for funding, planning, right-of-way acquisition, maintenance and operation. No direct provincial contribution is made.

The ten designated county main roads are as follows:

(a) Looking Back Lake Road (East of SR 625)

This gravelled two lane road runs within a 30 metre right-of-way to the east of Highway 21 and connects with the Joseph Lake Road.

(b) Joseph Lake Road

This gravelled two lane road runs in a north-south direction from the County of Strathcona to SR 623, just west of Miquelon Lake Provincial Park. This 12.8 km road link provides access to the western boundary of Joseph Lake. The roadway is built within a 30 metre right-of-way.

(c) Airport Road

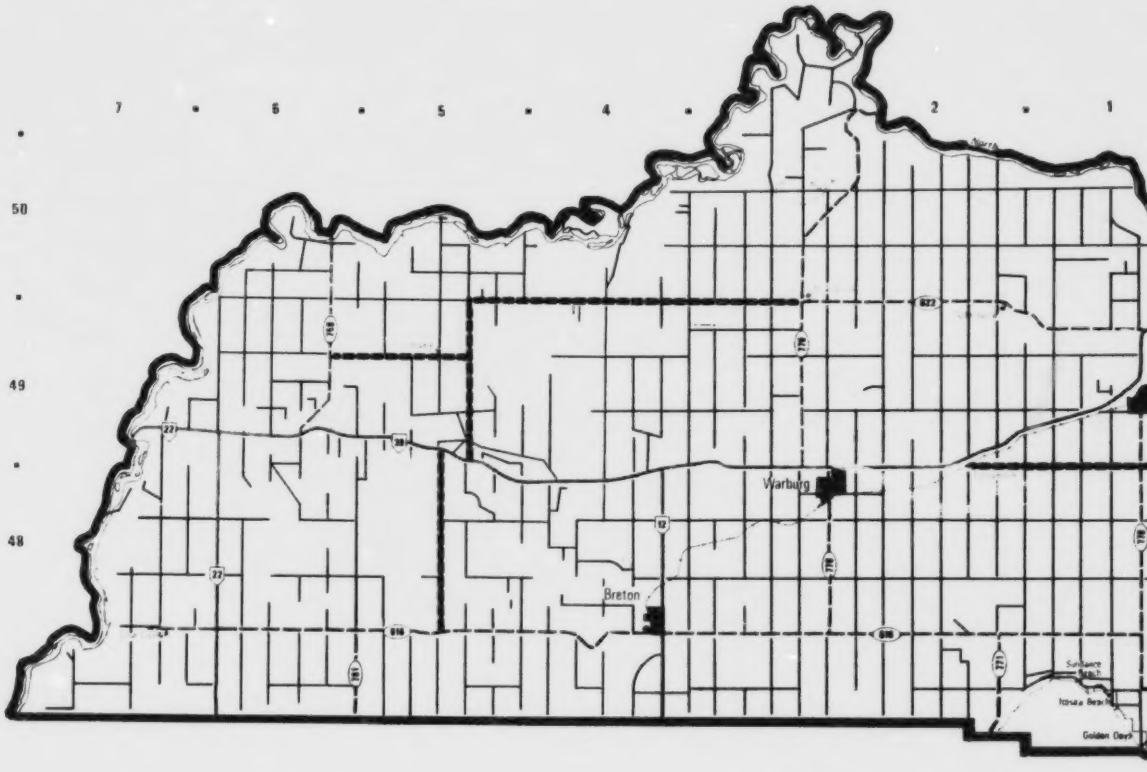
This gravelled two lane facility provides connecting access between Highway 2 and Highway 21 just north of the City of Leduc. This roadway is 19.3 km in length and is built within a 30 metre right-of-way with portions of the roadway treated for dust control.

(d) Cloverlawn North Road (South of the Hamlet of Rollyview)

This gravelled two lane facility runs in a north-south direction between SR 616 and SR 623. This roadway is 12.8 km in length and is built within a 20 metre right-of-way.

(e) Ord Lake Road (Southern Extension of SR 814)

This gravelled two lane facility runs in a north south direction between SR 623 and SR 616, as a southern extension of SR 814.



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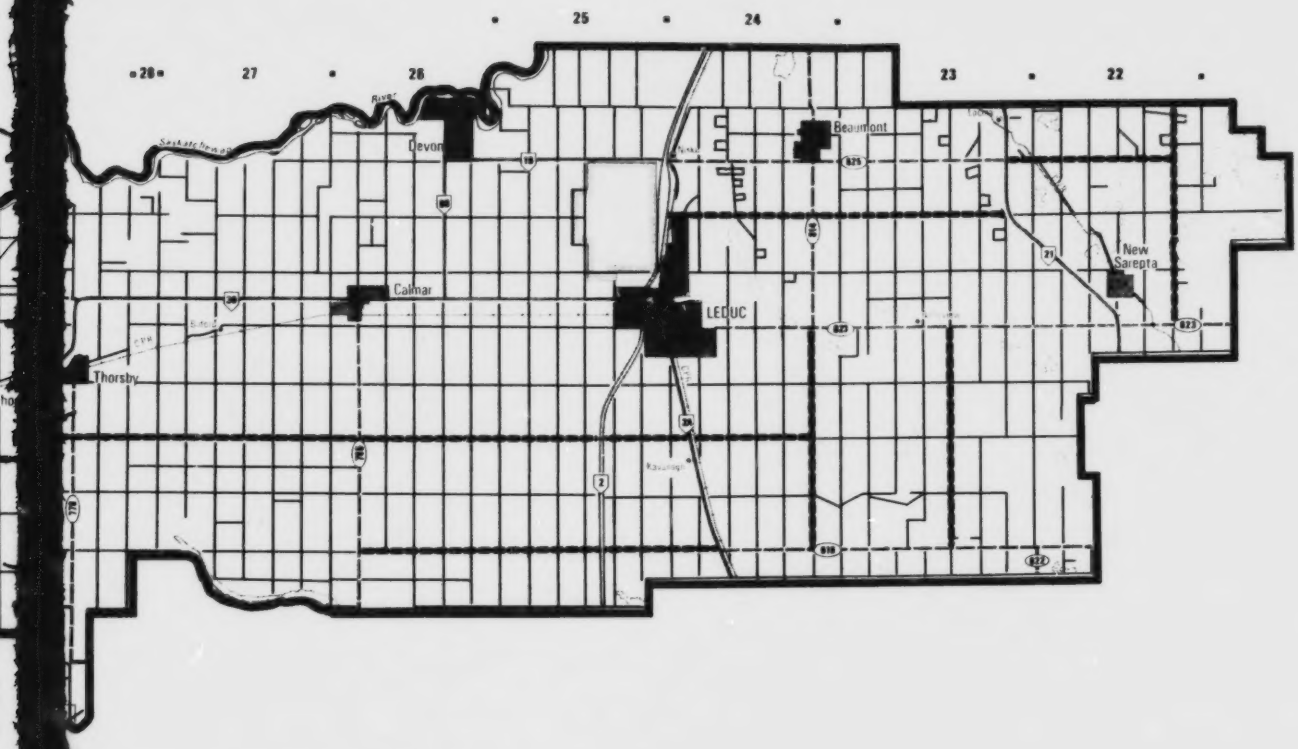

County Main Road

Local Road

MAP 6

COUNTY MAIN ROADS AND LOCAL ROADS

This facility is built within a 20 metre right-of-way and is used primarily as an inter-community access route.

(f) Sunnybrook-Kavanagh Road

This gravelled two lane facility runs in an east-west direction linking Highway 39 at Sunnybrook with Highways 2 and 2A south of the City of Leduc. East of Highway 2A, the road extends to the Ord Lake Road. This roadway link serves as an alternate east-west route for local traffic.

(g) Tower Road (Extension of SR 616)

This gravelled two lane facility runs between SR 795 and the junction of Highway 2A and SR 616 near the southern boundary of the County. This rural farm access road and inter-community road link is built within a 20 metre right-of-way.

(h) St. Francis West Road

This gravelled two lane facility connects with Mobuck Road near Lindale. The portion west of St. Francis is over 19.3 km in length and is built within a 20 metre right-of-way. This facility serves as an inter-community access road.

(i) Mobuck Road

(a) Part of this gravelled two lane facility provides a north-south link between Highway 39 and Lindale. This road segment has a length of 9.6 km and is constructed within a 20 metre right-of-way.

(b) The other portion of this roadway provides an east-west link between Lindale and SR 759 to the west. This road link is 8 km in length, and is constructed within a 20 metre right-of-way.

(j) Carnwood South Road (South of Highway 39)

This gravelled road links Highway 39 and SR 616, and provides local farm access for the south-western portion of the County. This facility is over 11.2 km in length and is constructed within a 20 metre right-of-way.

5. Local Roads

Local roadways are developed principally for providing direct access to abutting properties. The basic traffic function of a local road is to allow vehicles to reach the frontage of properties from the main highways and secondary roads. Since these roads are not designed for moving large volumes of traffic, they are generally not very continuous and may operate at low speeds depending on the

condition of the surface. Local roads generally make up 70 to 80 percent of the total rural road mileage and carry between 2 and 15 percent of the total traffic. Rural local roads carry all types of vehicles. The number and type of trucks (light/medium; vehicle/farm equipment) will depend upon the adjacent land use.

Map 6 illustrates the existing network of rural local roads in the County of Leduc.

6. Rural Road Surface Conditions

Map 7 illustrates the existing surface conditions of the primary highways, secondary roads, county main roads and local roads serving the County of Leduc. The inventory of roadway surfaces identifies those roadway surfaces which currently exist as paved, oiled or gravelled facilities. Paved facilities include all primary highways and the following secondary roads: 778, 795, 625, 623 and portions of 770, 814 and 616. The only oiled facility is Sunnybrook-Kavanagh Road. The remaining roads in the County are gravelled.

Of the paved facilities, SR 795 and a portion of SR 616 have a base course treatment and not a full pavement structure.

In discussions with the County Public Works staff, the majority of rural roads in the County are classified as Class II. Class II refers to very good all weather gravel roadway on a 20 metre right-of-way, adequate for moderate levels of traffic.

7. Existing Traffic Volumes

Existing daily traffic volumes in the County of Leduc are summarized in a generalized fashion on Map 8[1]. The highest traffic volumes (in excess of 10,000 AADT[2]) are located in the Highway 2 corridor connecting the City of Edmonton with the County. Traffic volumes calculated for 1984 range between 10,210 AADT at the southern portion of Highway 2 to over 33,150 AADT at Highway 2, 1 km north of Nisku. The roadway sections just north of the City of Leduc have the highest traffic volumes recorded for the entire province.

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1. See Appendix 2 for specific traffic volumes on individual primary highways and secondary roads in the County of Leduc for 1983 and 1984.

2. AADT - average annual daily traffic expressed in vehicles per day, and calculated by dividing the total traffic by 365 days. Volumes represent two-way traffic.

Roadways with volumes in the 5,000-10,000 AADT range are located primarily on the east side of the County. Highways 60 at Devon, Highway 19 north of the Edmonton International Airport, Highway 39 just west of the City of Leduc and SR 814 north of Beaumont, all recorded 1984 volumes in excess of 5,000 AADT.

The next highest range of traffic volumes between 3,000 and 5,000 AADT are also located on the eastern side of the County. Highway 39 just west of Calmar, Highway 60, SR 625, Highway 2A, and Highway 21 have recorded volumes in the range of 3,000-5,000 AADT.

The west side of the County has generally recorded traffic volumes of less than 3,000 AADT levels. Roadways with AADT volumes between 1,000 and 3,000 are Highway 39 west of Calmar to the western boundary of the County, Highway 12, SR 795, and SR 623. Traffic volumes of less than 1,000 AADT are recorded on Highway 22, and SRs 616, 778, 771, 770, 761, 759, and 778.

8. Existing Truck Traffic

The truck traffic volumes indicated in Tables 1 and 2 are based on 1983 primary highway and 1984 secondary road counts and vehicle classification surveys undertaken by Alberta Transportation.

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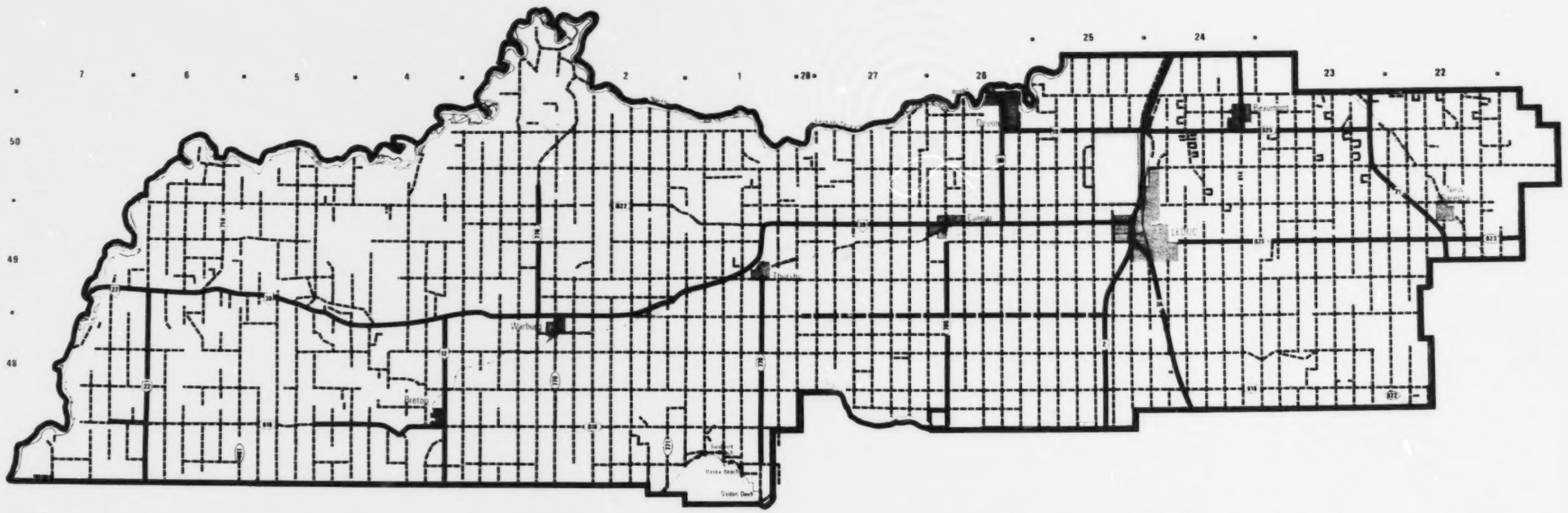

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MAP 7

INVENTORY OF ROAD SURFACE CONDITION

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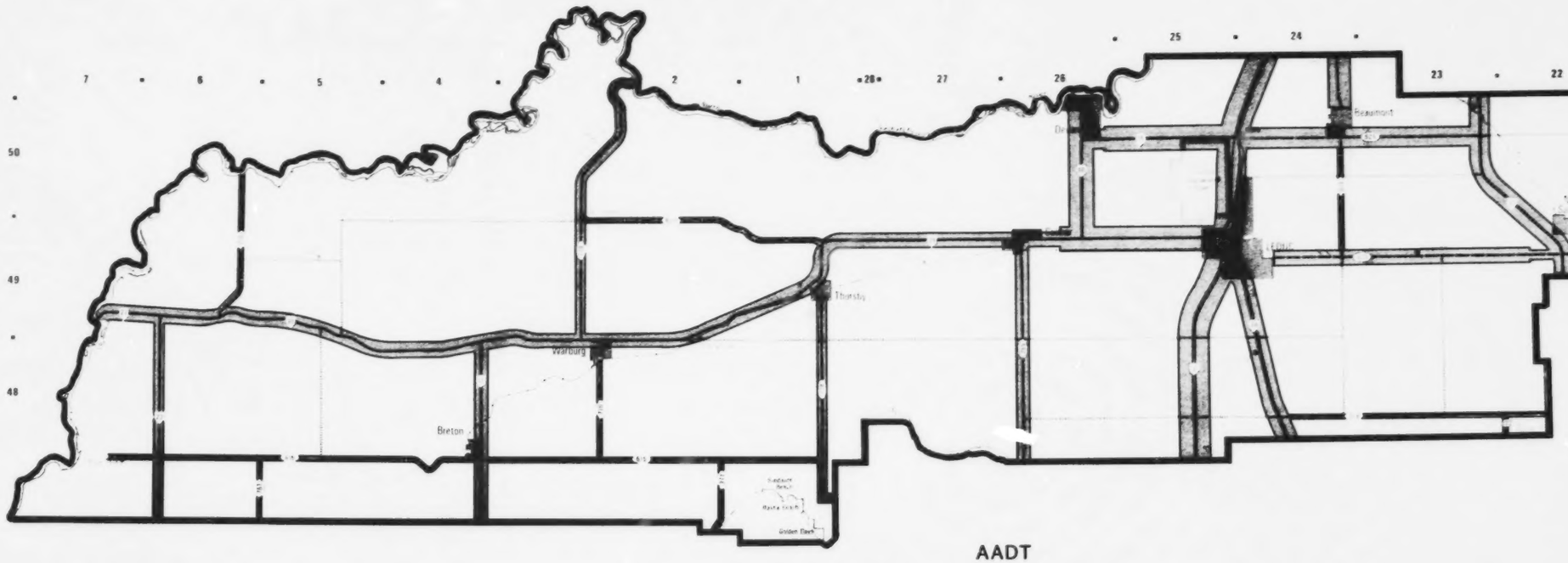

AADT

- 0 - 300
- 300 - 1000
- 1000 - 3 000
- 3 000 - 5 000
- 5 000 - 10 000
- 10 000 - 35 000

NOTE: AADT - weighted average annual daily traffic in both directions.

MAP 8

EXISTING TRAFFIC VOLUMES

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TABLE 1
SELECTED 1983 TRAFFIC VOLUMES AND VEHICLE
CLASSIFICATION STATISTICS FOR PRIMARY HIGHWAYS

HIGHWAY NUMBER	TO	FROM	WAADT	%PV	%RV	%TK
2	N of 2A S of Leduc	S of 39	14,830	78.2	5.0	16.8
	N of 39 at Leduc	S of 19 & 625	22,420	80.4	6.6	13.0
2A	N of 616	E of 2 S of Leduc	4,840	88.1	3.2	8.7
12	S of 39	N of 616	1,400	69.9	8.4	21.7
19	E of 60	Nisku	3,450	83.9	4.7	11.4
21	N of 623	S of 625	3,490	78.3	5.9	15.8
	W of 617 at Hay Lakes	S of 623	3,140	74.8	5.7	19.5
22	N of 616	S of 39	450	77.8	5.5	16.7
39	E of 22	W of 759	1,880	77.1	4.3	18.6
	E of 759	W of 12	1,820	76.4	4.4	19.2
	N of Thorsby	W of Calmar	3,500	84.2	3.4	12.4
	E of 60	W of 2 at Leduc	5,870	85.1	5.6	9.3
60	N of 39	S of 19	3,440	79.1	6.9	14.0
	N of 19	S of 627, N of Devon	6,120	85.5	3.6	10.9

Notes: WAADT - Weighted Average Annual Daily Two-Way Traffic (measured between two roadway points)
%PV - Percent Cars
%RV - Percent Recreation Vehicles
%TK - Percent Trucks

Source: Alberta Transportation, System Planning Branch, November 1984.

TABLE 2
SELECTED 1984 TRAFFIC VOLUMES AND VEHICLE
CLASSIFICATION STATISTICS FOR SECONDARY ROADS

SECONDARY ROAD	TO	FROM	WAADT	%PV	%RV	%TK
759	N of 39	S of 624	200	72.6	2.6	24.8
761	N of 13	S of 616	50	71.0	0.0	29.0
770	N of 616	S of 39	150	78.0	0.4	21.6
771	N of 616	SE of Warburg	200	81.1	10.9	8.0
778	N of 616	S of Thorsby	790	90.2	3.9	5.9
795	N of 616	S of 39	850	82.2	3.2	14.6
814	N of 623	50th Street Ellerslie Rd.	1,870	85.2	2.6	12.1
822	N of 13	S of 616	140	71.0	1.3	27.7
616	E of 22	W of 761	230	78.4	1.1	20.5
	E of 761	W of 12	450	71.7	4.0	24.3
	E of 12	W of 778	170	76.1	2.7	21.2
	E of 2	W of 2A	340	88.9	5.1	6.0
	E of 822	S of 21	60	72.0	7.3	20.7
622	E of 770	W of 39 E of Telfordville	280	81.9	3.4	14.7
623	E of 2A at Leduc	N of 617	1,030	81.4	7.2	11.4
	E of 2A	N of 617	1,330	79.9	6.0	14.1
625	E of 2 and 19	W of 814	3,200	83.7	2.8	13.5

Notes: WAADT - Weighted Average Annual Daily Two-Way Traffic (measured between two roadway points)
%PV - Percent Cars
%RV - Percent Recreation Vehicles
%TK - Percent Trucks

Source: Alberta Transportation, System Planning Branch, November 1984.

All of the eight primary highways in the County of Leduc have moderate to high volumes of truck traffic, which is indicative of the rural farm base which these facilities traverse and their intra-provincial travel function. The largest volume of traffic is recorded on Highway 2, with trucks on this facility accounting for 10% to 16% of the total traffic. Highways 39, 12 and 21 have truck traffic volumes ranging between 19% and 22% of the total traffic volumes. This amounts to a daily, two way truck count in the range of 300 to 600 vehicles. Highway 12 has the highest percentage of truck traffic (21.7%) with only 69.9% for private vehicles and 8.4% for recreational vehicles. This indicates the importance of the facility for farm to market travel and inter-community travel. The other highway facilities, such as Highways 60, 22, 19, and 29 have moderate levels of truck traffic (between 8.6% for Highway 29, and 16.7% for Highway 22), which is considered normal for rural arterial facilities.

There is a diversity of truck traffic volumes for secondary roads in the County of Leduc. Secondary Roads 759, 770, 761 and 616 have a high percentage of truck traffic, ranging from 20% to 29% of total traffic. Traffic volumes along these four secondary roads is less than 500 weighted average annual daily two-way traffic (WAADT), which indicates the primary rural road access function and the importance of linking rural farm areas with nearby primary highway facilities. The highest percentage of truck traffic (29%) on a single road facility in the County was identified on SR 761 south of SR 616 (in the south-western corner of the County), but with very low total traffic volumes of 50 WAADT.

A low percentage of truck traffic was found on SRs 771 and 778 located just west and east Pigeon Lake. Of the remaining SRs in the County, SR 795, 814, 622, 623 and 625 have recorded truck traffic volumes of between 11% and 17% of total traffic volumes, which is considered a typical vehicle breakdown for rural collector type facilities.

IV. POPULATION AND EMPLOYMENT

The following text describes the population and employment trends. These data elements will be used in the preparation of population and employment projections for the County of Leduc for use in the analysis portion of the Rural Road System Study.

1. Population

(a) Historical Growth

The County of Leduc experienced slow and steady growth between 1971 and 1981. In particular, between 1976 and 1981, the County experienced a net population increase of approximately 1,834 (366 persons per year). This represents its period of highest growth. More rapid population growth was associated with urban municipalities on the east side of the County such as Beaumont, Calmar, Devon, and New Sarepta. Table 3 identifies the population trends in the study area for 1971, 1976 and 1981. Table 4 identifies the percent change in population for the County of Leduc and selected urban municipalities. The total 1981 population for the study area was 34,987 persons.

TABLE 3
POPULATION TRENDS IN THE STUDY AREA 1971 - 1981

MUNICIPALITY	1971	1976	1981
County of Leduc	10,537	10,949	12,783
City of Leduc	4,000	8,576	12,471
Beaumont	337	851	2,638
Calmar	800	872	1,003
Devon	1,470	2,786	3,885
New Sarepta	202	237	417
Breton	352	424	552
Thorsby	595	657	737
Warburg	464	408	501
TOTAL	18,757	25,760	34,987

Source: E.M.R.P.C. files, 1985.

TABLE 4
PERCENT CHANGE IN POPULATION IN THE STUDY AREA

MUNICIPALITY	% CHANGE 1971-76	% CHANGE 1976-81
County of Leduc	3.9	16.7
City of Leduc	114.4	45.4
Beaumont	152.5	210.0
Calmar	9.1	15.0
Devon	89.8	39.4
New Sarepta	17.3	75.9
Breton	20.5	30.2
Thorsby	10.4	12.2
Warburg	12.1	22.8

Source: E.M.R.P.C. files, 1985.

Table 5 indicates the limited population growth that has occurred in the hamlets in the County of Leduc between 1971 and 1981.

TABLE 5
TOTAL POPULATION IN HAMLETS
AND SUMMER VILLAGES
1971, 1976 AND 1981

MUNICIPALITY	1971	1976	1981
RURAL HAMLETS			
Looma	37	21	17
Nisku	41	42	77
Rollyview	-	52	75
Kavanagh	54	61	53
Buford	30	37	39
Sunnybrook	-	50	61
Telfordville	-	-	35
St. Francis	-	-	11
Lindale	-	127	34
Buck Creek	-	-	57
SUMMER VILLAGES			
Sundance Beach	-	20	11
Golden Days	-	10	30
Itaska Beach	-	2	8

Source: E.M.R.P.C. and B.R.R.P.C. files, 1985.

Table 6 identifies population growth in the rural municipalities of Leduc, Parkland and Wetaskiwin between 1966 and 1981. The County of Leduc's historic share of population growth has increased steadily between 1966 and 1981 but is much lower than that of the County of Parkland. The average annual growth rate in the County of Leduc between 1976 and 1981 was 3.35%.

TABLE 6
POPULATION TRENDS IN THE COUNTIES OF LEDUC, PARKLAND AND WETASKIWIN FOR 1966-1981

COUNTY	1966	1971	% CHANGE	AAG %	1976	% CHANGE	AAG %	1981	% CHANGE	AAG %
Leduc	10,294	10,537	2.36	0.47	10,949	3.91	0.78	12,783	16.75	3.35
Parkland	10,868	11,933	9.8	1.96	17,762	48.85	9.77	25,829	45.42	9.08
Wetaskiwin	8,435	8,023	-4.88	-0.98	8,260	2.95	0.59	9,026	9.27	1.85

Legend: % change - for the 5 Year Period
AAG% - Average Annual Growth Rate (% change/5)

Source: B.R.R.P.C. files, 1985.

The 1981 Census of Agriculture for Alberta recorded a total farm population of 6,313 persons in the County which represented 49.3 % of the total population.

(b) Existing Population

Tables 7 and 8 and Map 9 summarize the 1985 population for both the County of Leduc and the urban centres within the study area boundary. The County of Leduc estimated population is 13,296 while the total urban population within its boundaries is 23,941 for a total study area population of 37,237 persons. Table 8 indicates the change in population for the urban centres in the County between 1982 and 1985 based on estimates by Alberta Municipal Affairs, the E.M.R.P.C. and the B.R.R.P.C.

TABLE 7
RURAL POPULATION BY TRANSPORTATION ZONE, 1985

ZONE	POPULATION	ZONE	POPULATION	ZONE	POPULATION
1	918	9	181	17	599
2	1,160	10	264	18	126
3	748	11	531	19	455
4	332	12	827	20	550
5	30	13	288	21	842
6	1,119	14	811	22	423
7	N/A	15	423	23	807
8	692	16	399	24	771
				TOTAL	13,296

Note: Zone 7 is the City of Leduc. See Table 9.

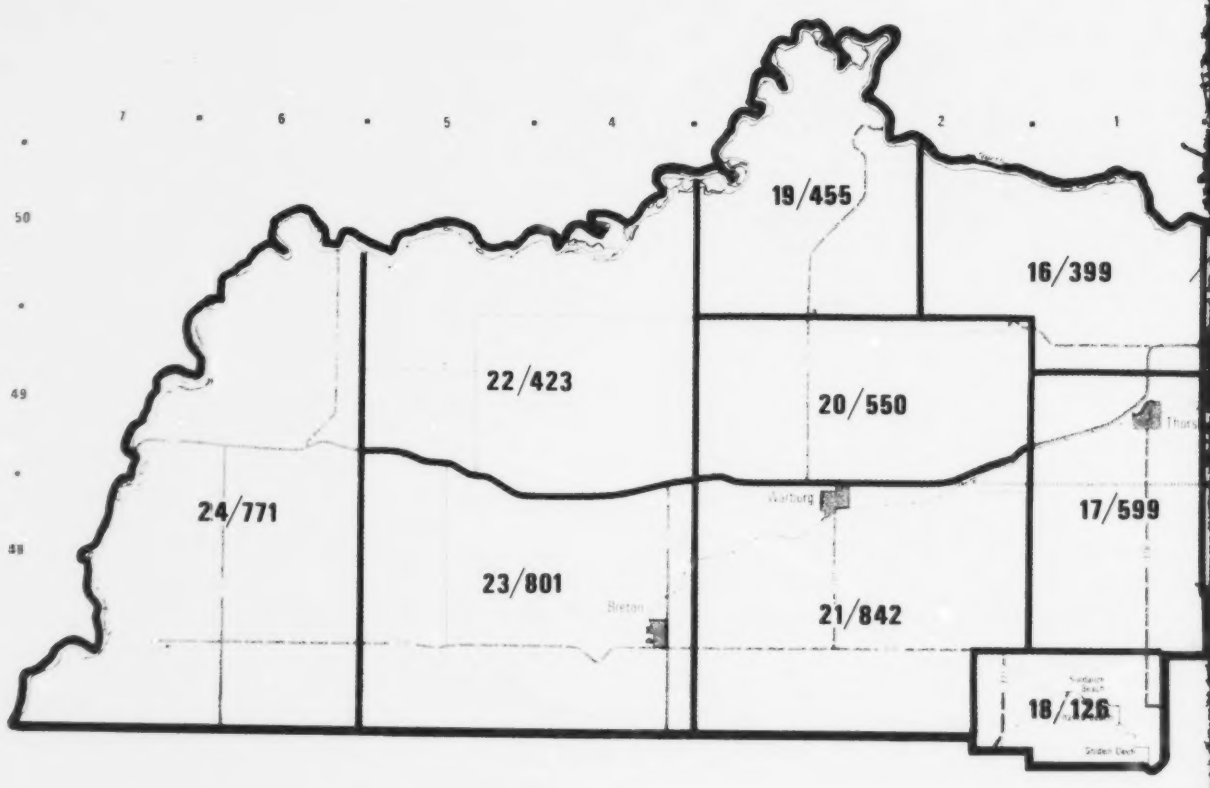
Source: E.M.R.P.C. calculations.

TABLE 8
POPULATION FOR URBAN CENTRES, 1982-1985

MUNICIPALITY	1982	1983	1984	1985
Beaumont	2,927	3,202	3,468	3,723
Calmar	1,061	1,118	1,137	N/A
Devon	3,931	3,910	N/A	3,871
City of Leduc	12,500	N/A	12,471	12,926
New Sarepta	461	461	N/A	N/A
Breton	566	548	548	534
Thorsby	737	N/A	N/A	737
Warburg	541	N/A	552	552
TOTAL	22,724	23,017	23,284	23,941

Note: N/A - Not Available, a municipal census was not undertaken that year; the latest available figure is used to calculate the total.

Source: Alberta Municipal Affairs, 1985.
E.M.R.P.C. Files, 1985.
B.R.R.P.C. Files, 1985.



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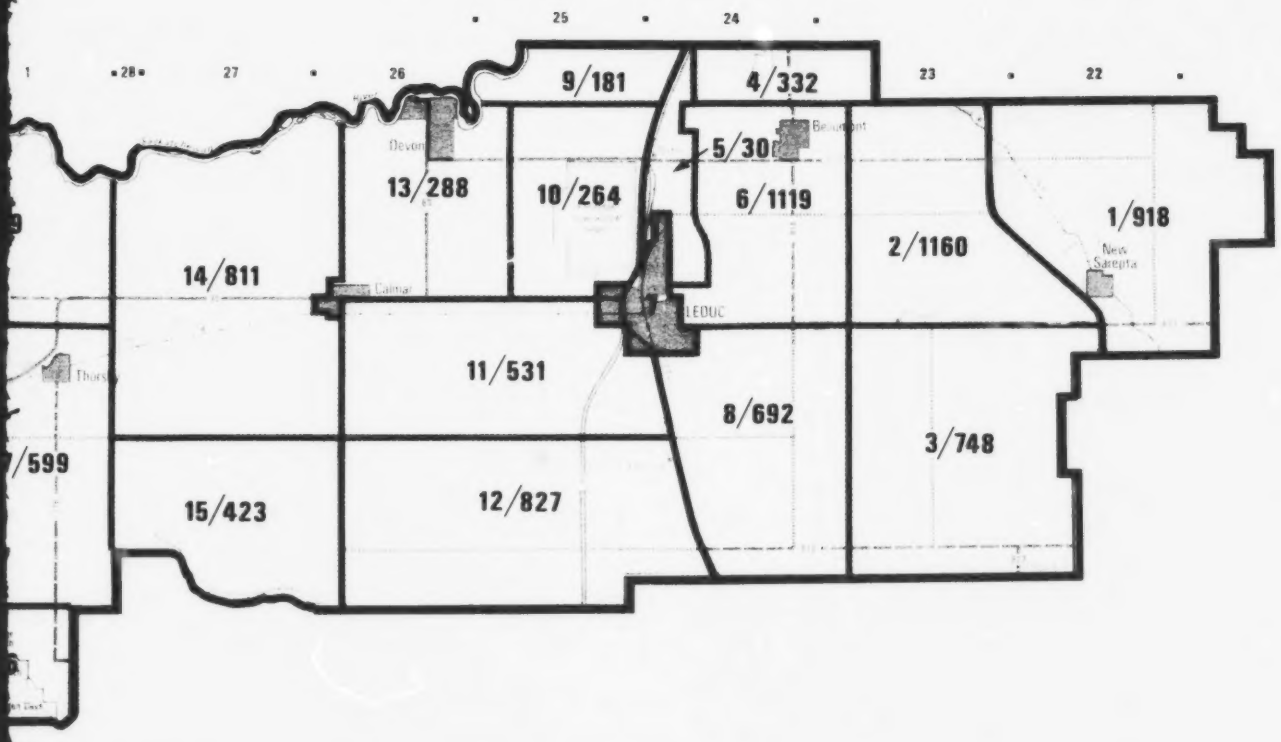


1/918 Transportation Zone / 1985 Population

MAP 9

1985 RURAL POPULATION BY TRANSPORTATION ZONES

2. Employment

The continued prosperity of the County of Leduc is closely linked to the economic prospects for the agriculture and oil and gas sectors.

Table 9 highlights historical population and labour force data for 1976 and 1981 for the County of Leduc. Table 10 highlights the same information for the County of Parkland and County of Wetaskiwin for comparison purposes.

TABLE 9

POPULATION AND LABOUR FORCE DATA, COUNTY OF LEDUC, 1976 and 1981

	1976			1981		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
Total Population			10,949			12,783
Labour Force Age Population (15 to 64)	4,100	3,380	7,480	5,065	4,150	9,215
Labour Force	3,565	2,070	5,635	4,245	2,065	6,310
Employed Labour Force	3,510	2,050	5,560	4,150	2,025	6,175
Unemployed Labour Force	50	15	65	95	40	135
Labour Force Participation Rate	87.1%	61.2%	75.3%	83.8%	49.8%	68.5%

Source: Census of Canada, 1976 and 1981.

TABLE 10
POPULATION AND LABOUR FORCE DATA,
COUNTY OF PARKLAND AND COUNTY OF WETASKIWIN, 1976 and 1981

	1976			1981		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
COUNTY OF PARKLAND						
Total Population			17,762			25,829
Labour Force Age Population (15 to 64)	6,480	5,620	12,100	9,725	8575	18,300
Labour Force	5,570	2,980	8,550	8,425	4580	13,005
Employed Labour Force	5,455	2,885	8,340	8,175	4360	12,535
Unemployed Labour Force	115	95	210	255	215	470
Labour Force Participation Rate	86.0%	53.0%	70.7%	86.6%	53.4%	71.0%
COUNTY OF WETASKIWIN						
Total Population			8,260			9,026
Labour Force Age Population (15 to 64)	3,195	2,700	5,870	3,440	2,995	6,435
Labour Force	2,805	1,780	4,585	2,925	1,520	4,445
Employed Labour Force	2,765	1,755	4,520	2,845	1,485	4,330
Unemployed Labour Force	45	25	70	80	35	115
Labour Force Participation Rate	87.9%	65.9%	78.1%	85.0%	50.8%	69.0%

Source: Census of Canada, 1976 and 1981.

The total labour force in the County of Leduc in 1981 was 6,310 people. Total employed labour force in 1981 was 6,176, an increase of 615 people from 1976. The County of Wetaskiwin has a similar labour force profile with limited growth in its labour force. The County of Parkland experienced much higher labour force growth between 1976 and 1981, along with its more rapid population growth.

The 1981 place of work data, taken from the 1981 census indicated a number of interesting results, which are summarized in Table 11.

TABLE 11
PLACE OF WORK DATA, COUNTY OF LEDUC

Total Employed Labour Force Living in the County	6,175
Total Employed Labour Force Living and Working in the County	695
- living in the County and working at home	2,320
- living in the County but with no usual place of work	20
- living outside of the County and working in the County	7,605
- living in the County and working outside of the County	3,115
- employed labour force working in the County	10,640

Source: 1981 Census of Canada.

Of the total 1981 employed labour force of 6,175 living in the County, 3,035 (49.1%) worked in the County, 1,160 (18.7%) worked in City of Edmonton, 390 (6.3%) in the City of Leduc, 185 (3.0%) in Warburg, 115 (1.9%) in Breton, 355 (5.7%) in Drayton Valley and 105 (1.7%) in the County of Strathcona.

The 1981 employed labour force living in the study area was 16,595.

TABLE 12
TOTAL EMPLOYED LABOUR FORCE IN THE STUDY AREA, 1981

County of Leduc	6,175
City of Leduc	6,015
Beaumont	1,315
Calmar	475
Devon	1,770
New Sarepta	205
Breton	225
Thorsby	275
Warburg	140
TOTAL	16,595

Source: 1981 Census of Canada.

The 1985 employment distribution is based on 1981 census data and an E.M.R.P.C. telephone survey of major employers in the County of Leduc. Employment coefficients for 1981 were determined for each transportation zone and applied to the 1985 estimated population for each transportation zone. In this way, the 1981 employed labour force data for the County of Leduc were updated to 1985 and distributed so as to correspond to the 24 transportation zones (see Table 13 and Map 10).

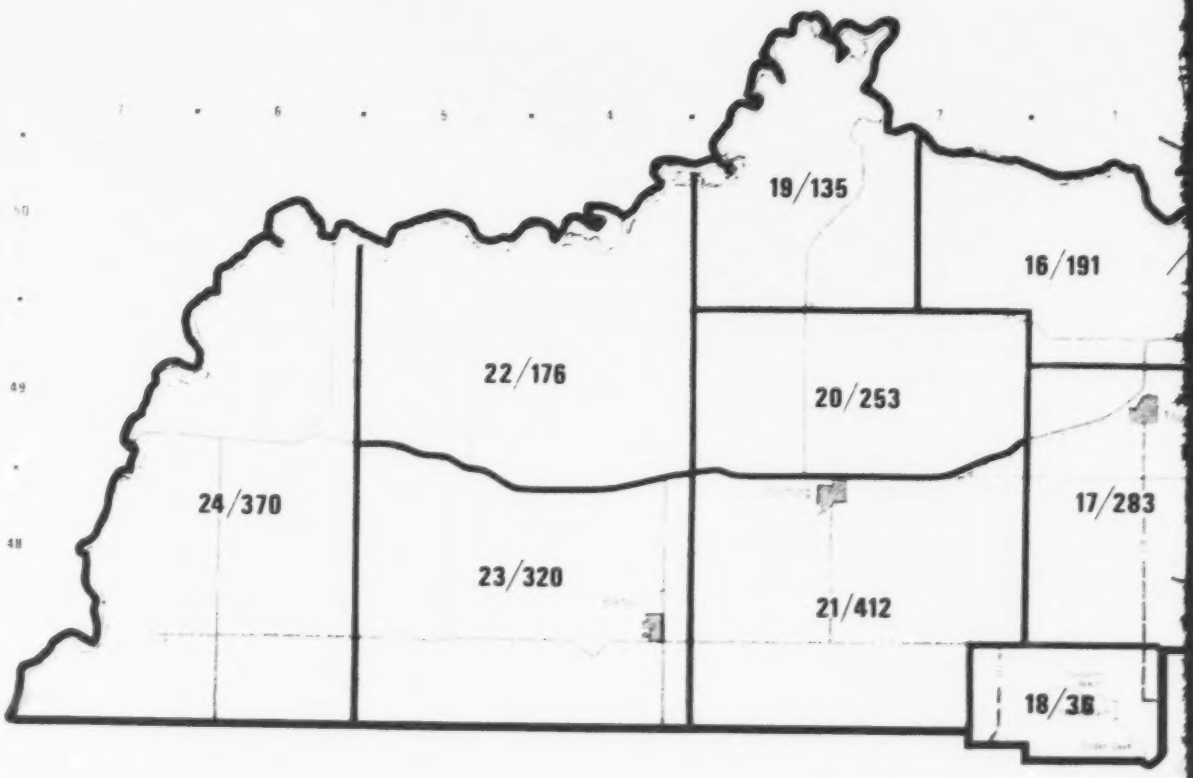
TABLE 13
POPULATION AND EMPLOYED LABOUR FORCE BY
TRANSPORTATION ZONE FOR THE COUNTY OF LEDUC, 1985

ZONE	POPULATION	LABOUR FORCE	ZONE	POPULATION	LABOUR FORCE
1	918	491	13	288	101
2	1,160	568	14	811	421
3	748	392	15	423	227
4	332	172	16	399	191
5	30	9	17	599	283
6	1,119	577	18	126	36
7	-	-	19	455	135
8	692	358	20	550	253
9	181	94	21	842	412
10	264	140	22	423	176
11	531	297	23	807	320
12	827	418	24	771	370
			TOTAL	13,296	6441

ESTIMATED NON-RESIDENT LABOUR FORCE

ZONE		
10	Edmonton International Airport	1,700
5	Nisku Industrial Park	10,000
19	Genesee Power Plant	50
1, 13, 15, 20-24	Oil and Gas Sector	1,000
	TOTAL	12,750

TOTAL RESIDENT AND NON RESIDENT LABOUR FORCE IN THE COUNTY OF LEDUC	19,191



1985 Employed Labour Force For The County Of Leduc		6,441 Persons
Additional Employed Labour Force		
Transportation Zones		
10	Edmonton International Airport	1,700 Persons
5	Nisku Industrial Park	10,000 Persons
19	Genesee Power Plant	50 Persons
20-24 13,15,1	Oil/Gas Sector	1,000 Persons
Total Estimated Employed Laber Force (Rural)		19,191 Persons

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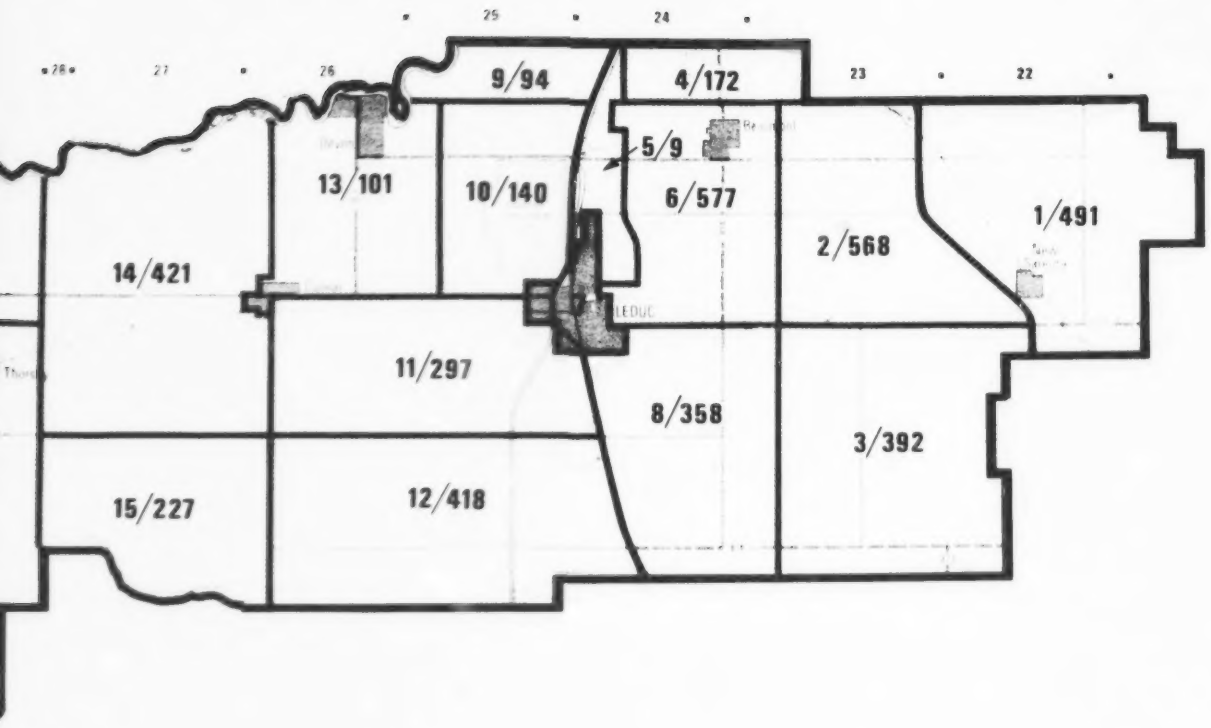


1/491 Transportation Zone / 1985 Employment

MAP 10

ESTIMATED RURAL EMPLOYMENT DISTRIBUTION BY TRANSPORTATION ZONE

The Nisku Industrial Park has 2,832 net hectares zoned for commercial/ industrial development of which 35.7% is developed. The work force was estimated to be in range of 4,000-5,000 persons. An additional 5,000 persons were based in the Park but not necessarily working there on an everyday basis, for a total estimated work force of 10,000. At the Edmonton International Airport, 1,700 persons are currently employed in airport operations and related servicing.

The Genesee Power Project currently employs 50 people with 250 projected for 1986.

The oil and gas resource sector is estimated to employ about 1,000 persons throughout the County. This figure does not include those involved in the servicing industry.

V. TRAFFIC CONDITIONS

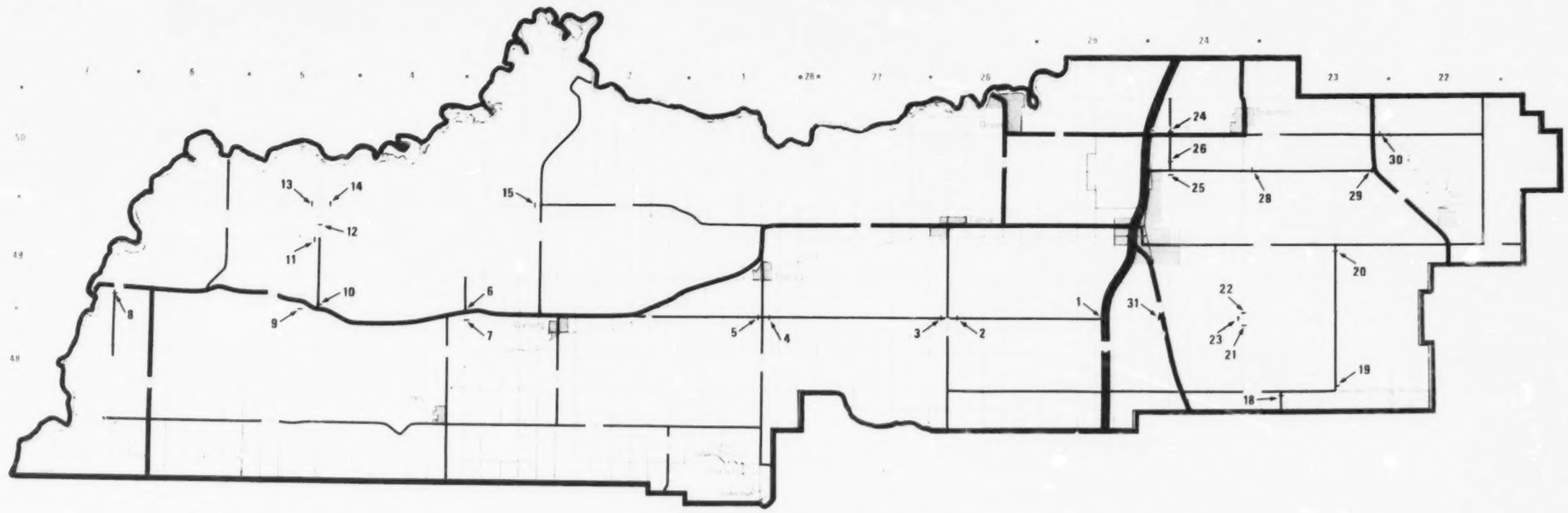
1. 1985 Traffic Data

In co-operation with Alberta Transportation, new traffic counts were undertaken at thirty-one locations throughout the County of Leduc. The locations identified for the 1985 traffic counts were primarily based on the recommendations of the County of Leduc's administrative and public works staff. The locations for traffic counts focussed on the county's main road system, where no traffic data were available (see Map 11 for the 1985 traffic count locations). Traffic data, average annual daily traffic (AADT) and average summer daily traffic (ASDT) are available for primary highways and secondary roads in the County of Leduc (see Appendix 2 for 1983 and 1984 AADT and ASDT information).

The 1985 traffic counts were conducted over a four week period, between October 23 and November 25. During this time, cold weather and early snow conditions influenced travel patterns and therefore traffic volumes. The colder weather also affected some of the portable traffic counters which resulted in some incomplete traffic counts.

Tables 14, 15 and 16 record the traffic counts taken at specific locations for each day of the traffic recording period. Traffic counts were taken for nine, twelve and twenty four hour periods, but data for all three time periods were not consistently available. The twelve hour counts and some twenty-four hour counts are documented on the tables.

COUNTY OF LEDUC Rural Road System Study



Rural Freeway / Expressway (10,000+ AADT)

Rural Arterial (2,000-9,999 AADT)

Rural Collector (200-1,999 AADT)

NOTE: All roadways not otherwise classified, function as local roads with less than 200 AADT.

See table 16 for traffic counts.

MAP11

1985 TRAFFIC COUNT LOCATIONS

Edmonton Metropolitan Regional Planning Commission

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TABLE 14
TRAFFIC COUNTS - WEST SIDE OF THE COUNTY OF LEDUC
(From October 23, 1985 to November 4, 1985)

STATION NUMBER	LOCATION		WED. 23	THURS 24	FRI. 25	SAT. 26	SUN. 27	MON. 28	TUES. 29	WED. 30	THURS 31	FRI. 1	SAT. 2	SUN. 3	MON. 4	AADT CALCULATIONS
1	Sunnybrook-Kavanagh Road N.W. 33-48-25-W4th	12h 24h	:	618 779	650	603 778	452	482 590	519	538	536 679	640 799	520	390 529	565 694	745 AADT
2	Sunnybrook-Kavanagh Road East of SR 795	12h 24h		186	161	176	132	117	134	144	158	167	172	134	143	216 AADT
3	Sunnybrook-Kavanagh Road West of SR 795	12h 24h									267 343	278 347	245 319	261 335	270 319	364 AADT
4	Sunnybrook-Kavanagh Road East of SR 778	12h 24h		431	398	459	248	303	317 403	267	246	219 288	183	134	164	385 AADT
5	Sunnybrook-Kavanagh Road West of SR 778	12h 24h		204	228	232	174 218	157	156	191	217	169	164		200	265 AADT
6	East of Alsike 0.3 km North of 39	12h 24h									162	170	125	103	213	212 AADT
7	East of Alsike 1 km South of 39	12h 24h		67 79	45 58	45 64		38 50	27 39	24 36	36 50	45 58	34 47	29 44	75 91	59 AADT
8	Local Road 0.5 km South of 22	12h 24h		446	426	219 270	149 199	275	301	359	331	374	243 308	159		411 AADT
9	South of Carnwood 0.3 km South of 39	12h 24h		111	125	90	118	99		102	112	65	80	74		141 AADT
10	At Carnwood N.W. 2-49-5-W5th	12h 24h		370	387	264 335	242	256	342	294	324	310	223 305	234		416 AADT
11	East of Lindale S.W. 27-49-5-W5th	12h 24h		145		131	117	109	179	121	156	140	64			184 AADT
12	At Landfill Site N.W. 26-49-5-W5th	12h 24h			198 254	117 168	92 110	89 107	114 154	117 166	113 153	118 156	85 107	74 90		152 AADT
13	North of Lindale S.E. 3-50-5-W5th	12h 24h			105	78	76	46	77	67	50					95 AADT
14	West of St. Francis N.W. 35-49-5-W5th	12h 24h			95	68		63	79	99	103	96		69		121 AADT
15	West of St. Francis N.W. 34-49-3-W5th	12h 24h			129	139		72	121	188	130	101	135	102		177 AADT

TABLE 15
TRAFFIC COUNTS - EAST SIDE OF THE COUNTY OF LEDUC
(From November 5, 1985 to November 14, 1985)

STATION NUMBER	LOCATION		TUES. 5	WED. 6	THURS 7	FRI. 8	SAT. 9	SUN. 10	MON. 11	TUES. 12	WED. 13	THURS 14	AADT CALCULATIONS
16	1 km West of Highway 2 and 616 (not illustrated on map)	12h 24h		370	303	372	296	264	256	374	337		438 AADT
17	0.4 km East of Highway 2 and 616 (not illustrated on map)	12h 24h		592									770 AADT
18	Local Road N.W. 7-48-23-W4th	12h 24h		186	182	218	156	84 127	140				218 AADT
19	North of 616 S.E. 16-48-23-W4th	12h 24h		95	94	77	106		81	64	82	77	111 AADT
20	S. of 623, Near Rollyview N.W. 22-49-23-W4th	12h 24h		182	188		153	122	161	158	174	214	231 AADT
21	South of 814 N.E. 34-48-24-W4th	12h 24h		86	48	73	59			85	64		100 AADT
22	South of 814 S.W. 2-49-24-W4th	12h 24h		54			64		68	82	59	70	88 AADT
23	Sunnybrook-Kavanagh Road N.E. 34-48-24-W4th	12h 24h		89	66	65	71	86	41	85	134	84	110 AADT
24	North of 625 9 St. Nisku	12h 24h		354									460 AADT
25	South of Airport Road 9 St. Nisku	12h 24h		175	129	170			70				170 AADT
26	North of Airport Road 9 St. Nisku	12h 24h		296	263	287	101	41	102	278			255 AADT
27	West of 814 Airport Road	12h 24h											Counter Malfunctioned
28	East of 814 Airport Road	12h 24h		213 254	176 221	208 253	120 159	97 137	136 184	202 255	208 247	167 206	200 AADT

TABLE 16
TRAFFIC COUNTS - EAST SIDE OF THE COUNTY OF LEDUC
(From November 5, 1985 to November 25, 1985)

STATION NUMBER	LOCATION		TUES. 5	WED. 6	THURS 7	FRI. 8	SAT. 9	SUN. 10	MON. 11
29	West of 21 Airport Road	12h 24h		149	138	170	142	119 154	141
30	East of 21 and 625	12h 24h							
31	West of Kavanagh West of 2A	12h 24h							

STATION NUMBER	LOCATION		TUES. 12	WED. 13	THURS 14	FRI. 15	SAT. 16	SUN. 17	MON. 18
29	West of 21 Airport Road	12h 24h	151	189	135	174	143	132	122
30	East of 21 and 625	12h 24h		239	231	247	246		198
31	West of Kavanagh West of 2A	12h 24h					139 179	140 175	119 154

STATION NUMBER	LOCATION		TUES. 19	WED. 20	THURS 21	FRI. 22	SAT. 23	SUN. 24	MON. 25	AADT CALCULATIONS
29	West of 21 Airport Road	12h 24h	169	146	142	120	149	84		200 AADT
30	East of 21 and 625	12h 24h								303 AADT
31	West of Kavanagh West of 2A	12h 24h	129 170	141 180	127 159	116 168	110 137	119 149	101 137	162 AADT

Preliminary AADT counts can be calculated from the traffic volume data collected by using the highest recorded daily volume count at each location and multiplying it by traffic conversion factors (which incorporate monthly, weekday and weekend volume factors). AADT counts are indicated on Tables 14, 15 and 16.

Based on these AADT counts, the County of Leduc's main road system and selected local roads can be grouped into three categories: high, medium and low volume roadways. Traffic volumes over 450 AADT were classified as high volume roadways and those with less than 200 AADT were classified as low volume roadways. The following table identifies the traffic volume classification for the county's main roads and for selected local roads.

TABLE 17
TRAFFIC VOLUME CLASSIFICATION RATING FOR THE COUNTY
MAIN ROADS AND SELECTED LOCAL ROADS, 1985

COUNTY MAIN ROADS	TRAFFIC COUNT LOCATION	REVISED FIGURES AADT	TRAFFIC VOLUME CLASSIFICATION
East of S.R. 625	30	303	Medium
Joseph Lake Road*		300	Medium
Airport Road	28, 29	200	Medium
South of Hamlet of Rollyview	20, 19	111-231	Low-Medium
South of SR 814	22, 21	88-100	Low
Sunnybrook-Kavanagh Road	1 to 5, 31	216-745	Medium-High
West of the Hamlet of St. Francis	14, 15	121-177	Low
North of Highway 39 (Carnwood)	10, 12	152-416	Low-Medium
Mobuck Road, Hamlet of Lindale	11	184	Low
South of Highway 39 (Carnwood)	9	141	Low
SELECTED LOCAL ROADS			
North of Highway 39 (Alsike)	6	212	Medium
South of Highway 39 (Alsike)	7	59	Low
South of Highway 22	8	411	Medium
North of Lindale	13	95	Low

*Joseph Lake Road counts were undertaken by Alberta Transportation from June 28 to July 3, 1984.

Source: E.M.R.P.C. calculations, December 1985.

APPENDICES

APPENDIX 1
MAJOR LAND USE BY TRANSPORTATION ZONE, COUNTY OF LEDUC, 1985

ZONES	MAJOR USES	TOPOGRAPHY AND HYDROLOGICAL FEATURES	URBAN CENTRES	LAND USE BY-LAW DESIGNATION(S)
1	Farming Country Residences Municipal Recreation Area Gas and Oil Extraction Gas Plant	Flat to Rolling; Joseph Lake Ministick Lake Oliver Lake Looking Back Lake	New Sarepta (V)	Country Residential/ Agricultural Agricultural Wildlife Habitat
2	Farming Country Residences Gas and Oil Extraction Gas Plant	Flat to Rolling	Looma (H) Rollyview (H)	Country Residential/ Agricultural Agricultural
3	Farming Country Residences	Flat to Rolling; Big Hay Lake	-	Agricultural Wildlife Habitat Recreation/Open Space
4	Farming	Flat to Rolling; Cawes Lake	-	Agricultural
5	Commercial Development Industrial Park Development Electrical Substation	Flat	Nisku (H)	General Industrial Restricted Industrial Direct Control/ Industrial
6	Farming Country Residences Landfill/Transfer Site	Flat to Rolling; Saunders Lake Telford Lake Blackmud Creek	Beaumont (T)	Agricultural Country Residential/ Agricultural Recreation/Open Space
7	City of Leduc	Telford Lake	Leduc (City)	-
8	Farming	Flat to Rolling; Ord Lake	-	Agricultural Recreation/Open Space
9	Farming Rabbit Hill Ski Area Water Skiing Facility Amberlea Meadows	Flat to Rolling; North Saskatchewan River	-	Agricultural
10	Farming International Airport	Flat to Rolling; Whitemud Creek	-	Agricultural
11	Farming Gas Plant Gas and Oil Extraction Seed Cleaning Plant	Flat to Rolling; Whitemud Creek	-	Agricultural
12	Farming	Flat to Rolling; Eyot Lake Eyot Lake Irrigation Ditch Whitemud Creek	Kavanagh (H)	Agricultural
13	Farming Gas and Oil Extraction Fertilizer Plant	Flat to Rolling; North Saskatchewan River	Devon (T) Calmar (T)	Agricultural Recreation/Open Space

APPENDIX 1, continued

ZONES	MAJOR USES	TOPOGRAPHY AND HYDROLOGICAL FEATURES	URBAN CENTRES	LAND USE BY-LAW DESIGNATION(S)
14	Farming Electrical Substation Sand and Gravel Pits	Flat to Rolling; North Saskatchewan River	Buford (H)	Agricultural
15	Farming Country Residences Jubilee Park Enchantment Valley Gas Plant	Flat to Rolling; Wizard Lake		Agricultural Lake Shoreland
16	Farming Coal Lease Area	Flat; Strawberry Creek North Saskatchewan River		Agricultural Recreation/Open Space
17	Farming	Flat; Weed Creek	Thorsby (V)	Agricultural
18	Recreation Resort Cottage Provincial Park	Rolling; Pigeon Lake	Sundance Beach (SV) Itaska Beach (SV) Golden Days (SV) Mission Beach (SV) Kerr Cape Moonlight Bay Mitchell Beach Gilwood Beach	Lake Shoreland
19	Genesee Power Plant Coal Lease Area Coal Mining St. John's Boys School Gravel	Flat to Rolling; North Saskatchewan River	St. Francis (H)	Agricultural Wildlife Habitat
20	Farming Hutterite Colony Gas Plant	Flat; Strawberry Creek	Telfordville (H)	Agricultural
21	Farming Gas and Oil Gas Plants (3)	Flat; Strawberry Creek	Warburg (V) Sunnybrook (H)	Agricultural
22	Farming Recreation Alsike Centre Correctional Institute Wildlife Habitat Gravel Sites	Rolling to Hilly Coyote Lake Sardine Lake North Saskatchewan River Poplar Creek	Lindale (H) Carnwood Alsike	Agricultural Wildlife Habitat
23	Farming Gas and Oil Wildlife Habitat Gas Plant	Flat to Rolling; Poplar Creek Frog Lake Fifteen Lake	Breton (V)	Agricultural Wildlife Habitat
24	Farming Oil and Gas Wildlife Habitat Willey West Campground Gas Plants (2)	Flat to Rolling; Bucklake Creek North Saskatchewan River	Berrymoor Buck Creek (H)	Agricultural Wildlife Habitat Lake Shoreland

Table Note: (T) Town (H) Hamlet (V) Village (SV) Summer Village ( ) Place Name

APPENDIX 2
TRAFFIC VOLUMES ON PRIMARY HIGHWAYS AND SECONDARY ROADS
IN THE COUNTY OF LEDUC, 1983 and 1984

LOCATION	1983 AADT	1983 ASDT	1984 AADT	1984 ASDT
HIGHWAY 2				
South of 616 West of Millet	10,430	12,020	10,210	11,620
North of 616 West of Millet	10,690	12,320	10,230	11,640
2 km South of Leduc	11,330	13,060	11,300	12,950
South of 2A at Leduc	11,330	13,060	11,300	12,950
North of 2A at Leduc	14,710	16,950	14,360	16,330
West of Leduc - Railroad Overpass	14,710	16,950	14,360	16,330
South of 39 at Leduc	14,950	17,230	14,590	16,590
North of 39 at Leduc	17,160	19,780	16,750	19,050
South of 19 and 625 West of Nisku	26,560	28,920	28,940	31,000
North of 19 and 625 West of Nisku			33,150	35,510
1 km North of Nisku	32,660	35,560	33,150	35,510
North of Ellerslie	31,780	34,600	34,200	36,970
HIGHWAY 2A				
East of 2 at Leduc	4,220	4,460	4,140	4,380
1.5 km S. of Leduc	5,150	5,440	5,050	5,340
South of 616, North of Millet	4,570	4,830		
HIGHWAY 12				
South of 39 at Alsike	1,500	1,660	1,610	1,900
North of 616 East of Breton	1,300	1,440		
South of 616 East of Breton	1,440	1,600		
HIGHWAY 19				
East of 60, South of Devon	3,110	3,280	3,560	3,920
1.5 km East of 19 and 60	3,110	3,280	3,560	3,920
West of 2 and 625, West of Nisku	4,340	4,580	6,050	6,730
HIGHWAY 21				
South of 623, South of New Sarepta	3,080	3,450		
North of 623, South of New Sarepta	3,200	3,580		
South of 625, South of Looma	3,780	4,230		
North of 625, South of Looma	4,020	4,510		
HIGHWAY 22				
Highway 22 South, S.E. 7-49-6-W5th			990	1,070
South of 39, East of Buck Creek	510	560	990	1,070
Highway 22 West, S.E. 7-49-6-W5th			2,940	3,180
West of 39, East of Buck Creek	2,770	3,050	2,920	3,150
West of 39, S.E. 7-49-6-W5th	2,770	3,050	2,740	2,960

continued...

APPENDIX 2, continued

LOCATION	1983		1984	
	AADT	ASDT	AADT	ASDT
HIGHWAY 39				
East of 22, East of Drayton Valley	1,880	2,070	2,140	2,390
.7 km East of 22 and 39			2,250	2,450
West of 759 S.W. of Berrymoor	1,870	2,060		
East of 759 S.W. of Berrymoor	1,800	1,980		
3.6 km West of 12 and 39	1,800	1,980	2,010	2,240
West of 12 at Alsike	2,010	2,220	2,100	2,340
East of 12 at Alsike	2,060	2,270	2,110	2,360
West of 770, N.W. of Warburg WJ	1,900	2,100	2,110	2,360
East of 770, N.W. of Warburg WJ	1,910	2,110	2,200	2,460
West of 770, North of Warburg EJ	1,910	2,110		
East of 770, North of Warburg EJ	1,920	2,120		
West of 778, North of Thorsby	1,920	2,120		
South of 622, East of Telfordville	2,780	3,070		
East of 622, East of Telfordville	2,810	3,090		
1.6 km East of 39 and 622			2,860	3,140
1.4 km West of 39 and 60			5,530	6,170
West of 60, East of Calmar	5,800	5,910	5,530	6,170
East of 60, East of Calmar	5,560	5,670	5,300	5,900
3 km West of Leduc	5,960	6,080	5,300	5,900
West of 2 at Leduc	8,130	8,290	7,230	8,050
East of 2 at Leduc	7,840	7,990	6,970	7,760
HIGHWAY 60				
North of 39, East of Calmar	3,300	3,770	3,220	3,710
2.5 km North of 39 and 60	3,440	3,920	3,220	3,710
South of 19, South of Devon	3,550	4,050	3,790	4,300
North of 19, South of Devon	5,910	6,740	5,710	6,480
SECONDARY ROAD 616				
West of 22, East of Buck Creek			270	360
East of 22, East of Buck Creek			220	300
West of 761, East of Buck Creek	200	220	250	280
East of 761, East of Buck Creek	170	180	290	310
West of 12, East of Breton	610	660		
East of 12, East of Breton	380	410		
West of 770, South of Warburg	110	120		
East of 770, South of Warburg	140	150		

continued...

APPENDIX 2, continued

LOCATION	1983		1984	
	AADT	ASDT	AADT	ASDT
SECONDARY ROAD 616, continued				
West of 771, South of Sunnybrook	30	30		
East of 771, South of Sunnybrook	30	30		
West of 778, East of Itaska	240	330		
East of 778, East of Itaska	380	520		
West of 822, S.W. of Hay Lakes			50	60
East of 822, S.W. of Hay Lakes			60	70
SECONDARY ROAD 622				
East of 770 at St. Francis	250	270		
North of 39, East of Telfordville	310	340		
SECONDARY ROAD 623				
East of 2A at Leduc	4,420*	4,660*		
3.7 km East of 2A and 623	1,970	2,230		
West of 814, East of Leduc	1,380*	1,450*		
East of 814, East of Leduc	1,360*	1,420*		
West of 21, South of New Sarepta	940	1,060		
East of 21, South of New Sarepta	580	780		
4.2 km East of 21 and 623			740	990
SECONDARY ROAD 625				
East of 2 and 19, West of Nisku			7,930	8,380
.8 km East of 2 and 625	7,790	8,230	8,090	8,550
1.2 km West of 814 and 625			3,200	3,640
West of 814 at Beaumont	3,660	3,860		
East of 814 at Beaumont	1,010	1,070		
4.1 km West of 21 and 625			2,130	2,230
West of 21, South of Looma	590	620		
SECONDARY ROAD 759				
North of 39, S.W. of Berrymoor	190	210		
SECONDARY ROAD 761				
South of 616, East of Buck Creek	70	80	20	30

continued...

APPENDIX 2, continued

LOCATION	1983		1984	
	AADT	ASDT	AADT	ASDT
SECONDARY ROAD 770				
North of 616, South of Warburg	150	160		
South of 39, North of Warburg, EJ	1,800*	1,880*		
North of 39, N.W. of Warburg, WJ			450	490
South of 622 at St. Francis	370	390		
North of 622 at St. Francis	310	330		
SECONDARY ROAD 771				
South of 616	10	20		
SECONDARY ROAD 778				
North of 616, East of Itaska, SJ	590	790		
8 km South of Thorsby	850	1,150	790	1,060
South of 39, North of Thorsby	2,100*	3,120*		
SECONDARY ROAD 814				
North of 623, East of Leduc	90*	90*		
South of 625 at Beaumont	320	340		
North of 625 at Beaumont	3,200	3,380		
2.2 km North of Beaumont	6,090	7,110	5,460	5,750
SECONDARY ROAD 822				
South of 616, S.W. of Hay Lakes			40	50
SECONDARY ROAD 795				
2.8 km South of 39 and 795			1,390	1,670

LEGEND: AADT - Average Annual Daily Traffic expressed in vehicles per day and calculated by dividing Total Traffic by 365 days. Volumes represent two-way traffic.

ASDT - is the average summer daily traffic (from May to September inclusive)

* Where 1983 and 1984 traffic counts were not available, 1982 traffic volumes were recorded.

Source: 1984 Traffic Volume on Primary Highways and Secondary Roads. Alberta Transportation.

1985 Traffic Volume on Primary, Secondary and Other Roads. Alberta Transportation.

APPENDIX 3

TYPICAL CHARACTERISTICS OF VARIOUS MAJOR ROADWAY CATEGORIES

I. RURAL EXPRESSWAYS/FREEWAYS

1. Service Function

Rural freeways/expressways are built to accommodate the movement of large volumes of traffic at high speeds under free-flow conditions. Rural freeways connect the larger cities, industrial concentrations and recreational areas. They also serve as the major highway routes through intensely developed areas, and serve larger international and interprovincial travel movements. The need for unrestricted traffic movement on these facilities justifies the elimination of direct property access. Ultimate development will require grade separation at all intersecting roads.

2. Traffic Volume

Freeway/expressway construction may be required when traffic volumes are 8,000 AADT and greater. While a relatively high traffic volume is generally a prerequisite for freeway classification, the need for high-speed movement under free-flow conditions must also be present.

3. Flow Characteristics

On rural freeways/expressways, traffic flow should be uninterrupted and unrestricted. Opposing traffic lanes should be separated. Access should be completely controlled with grade separations or interchanges provided at all road, rail or pedestrian crossings. Parking should be prohibited.

4. Running Speed

The average running speed under most conditions is between 70 and 100 km per hour on rural freeways.

5. Vehicle Types

Rural freeways/expressways carry all types of vehicular traffic; heavy truck transports can amount to between 20 and 30 percent of the total volume.

6. Percent of Total System

Rural freeways/expressways are constructed only to connect cities and towns or heavily developed areas. The total mileage of these roads is usually less than 5 percent of the total mileage of rural roads.

7. Connections

Rural freeways/expressways should normally interchange traffic only with other freeways, arterials and collectors.

8. Stage Construction

All rural freeways/expressways should be planned and designed as multi-lane, divided, controlled-access facilities even though they may be developed by stage construction. In the plans for each stage of development, provision should be made for further improvements to existing sections.

II. RURAL ARTERIAL ROADS

1. Service Function

Rural arterial roads are intended to move large volumes of traffic at high speeds. The major distinction between this class and the rural expressway/freeway class is in the degree of control of access. Roads that have full control of access should, without exception, be in the freeway classification. Rural arterial roads, together with freeways, serve as the major routes in a network connecting the major economic regions and centres of a province such as large cities, industrial concentrations, agricultural areas and recreational facilities. In areas where freeways are not warranted by the traffic service required, rural arterials carrying high traffic volumes moving at high speed may have direct access to abutting lands restricted or even eliminated. This applies particularly in areas of intensive development and in undeveloped areas where the lack of other road service would encourage strip development.

2. Traffic Volumes

Average daily traffic volumes on rural arterials may vary from 1,000 and 12,000 vehicles. This range occurs because arterials in the sparsely populated regions may have relatively low traffic volumes while providing an important inter-regional traffic service. Average daily traffic volumes of 12,000 vehicles will occur on arterial highways in very densely populated areas.

3. Flow Characteristics

Rural arterial roads carry heavy traffic volumes at high speeds and should be designed for uninterrupted flow of traffic except at controlled intersections with major crossroads. However, intersections on high-speed roads controlled by traffic signals or stop signs are hazardous and should be avoided if possible. In some cases, grade-separated interchanges are warranted by traffic volumes. Pedestrian traffic may be prohibited on partially controlled-access arterial roads.

4. Running Speed

The average running speed should be between 65 and 96 km per hour. The higher speeds will be found on those sections of rural arterial roads having some control of access.

5. Vehicle Types

As rural arterial roads link the major regions of a province, they will serve all types of vehicles. Heavy truck traffic may amount to between 10 and 20 percent of the total volume carried.

6. Percent of Total System

Rural arterial roads will generally make up from 5 to 10 percent of the total rural road mileage and carry from 40 to 70 percent of the total travel depending upon the extent of rural freeway development in the area.

7. Connections

Rural arterial roads connect with all other classes of rural roads.

III. RURAL COLLECTOR ROADS

1. Service Function

Rural collector roads collect traffic from local roads and feed it to arterials, or distribute it from arterials to locals. They generally form an integrated network throughout all developed areas of a province and provide direct traffic service for developments such as tourist areas, mining areas and the smaller towns and villages. Rural collector roads have a land service function of equal importance to their traffic service function in that they directly serve the adjacent properties.

2. Traffic Volumes

Average daily traffic volumes on rural collector roads may vary from 200 to 5,000 vehicles depending on the population density.

3. Flow Characteristics

Traffic flow on rural collector roads is interrupted by stop conditions or signalized intersections at connections with arterials or other collector roads. Traffic flow is also impeded somewhat by vehicles leaving and entering the roadway directly from adjacent properties. Pedestrian traffic is not restricted.

4. Running Speed

The average running speed on rural collector roads will usually vary between 65 and 90 km per hour.

5. Vehicle Types

Although rural collectors may carry all types of vehicles, commercial traffic consists mainly of trucks in the 3- to 5- ton class. These are often farm trucks carrying produce such as milk, feed and livestock. These trucks may amount to as much as 30 percent of the volumes of traffic using these roads. Few heavy transport trucks use this class of roadways.

6. Percent of Total of System

Rural collector roads make up from 10 to 20 percent of the total rural road mileage and carry from 15 to 25 percent of the total rural travel.

7. Connections

Rural collector roads connect with all other classes of roads.

IV. RURAL LOCAL ROADS

1. Service Function

The main function of rural local roads is to provide land access. The only traffic service function of a local road is to allow vehicles to reach the frontage of properties from the main highways. Development roads that serve one or two natural resource areas may be considered as local roads until volumes and function justify reclassification.

2. Traffic Volumes

Traffic volumes on rural local roads are generally low but may be several hundred vehicles per day, depending on the density of development along the sides of the road.

3. Flow Characteristics

Traffic flow on rural local roads is interrupted by stop or yield conditions at all intersecting roads and is affected by traffic moving to and from adjacent properties. Pedestrian traffic is not restricted.

4. Running Speed

   Depending on the condition of the surface, the average running speed on rural local roads varies from 50 to 80 km per hour.

5. Vehicle Types

   In agricultural areas, trucking is done by light and medium vehicles with occasional heavy trucks. In mining and forestry areas, heavy units often predominate. The number of trucks will depend upon the adjacent land use and may range from less than 5 percent of the total vehicular volume to more than 50 percent.

6. Percent of Total System

   Local roads generally make up from 65 to 80 percent of the total rural road mileage and carry from 2 to 15 percent of the total travel.

7. Connections

   Rural local roads connect with collector and arterial roads.

SOURCE: Geometric Design Standard for Canadian Roads and Streets. Roads and Transportation Association of Canada.

Number/
Numéro

2

COUNTY
OF LEDUC

Rural Road System Study

Edmonton Metropolitan Regional Planning Commission

Background Report #2
Travel Forecasting and Evaluation

Prepared by
Edmonton Metropolitan Regional Planning Commission
in co-operation with Battle River Regional Planning Commission
September 1986

ACKNOWLEDGEMENTS

The Edmonton Metropolitan Regional Planning Commission wishes to acknowledge the assistance of the following agencies:

- Battle River Regional Planning Commission
- Alberta Transportation
- Stanley Associates Engineering Ltd.
- County of Leduc Council and Administration

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I. INTRODUCTION

The purposes of this report are: to describe municipal road system and operational concerns (Part II); to outline the transportation modelling process and traffic forecasts for the 1995 horizon year (Part III); and lastly to analyze the traffic forecasts to define major traffic interchanges, corridor deficiencies and specific roadway link requirements (Part IV).

II. ROAD SYSTEM CONCERNS

It is beyond the scope of this study to field investigate all roads in order to determine every specific problem. However, based on discussions with Council and County staff, a variety of road system concerns have been identified and are illustrated generally on Map 1.

These can be classified according to two major types: concerns related to the municipal road system itself and those related to public works operational matters.

1. Municipal Road System Concerns

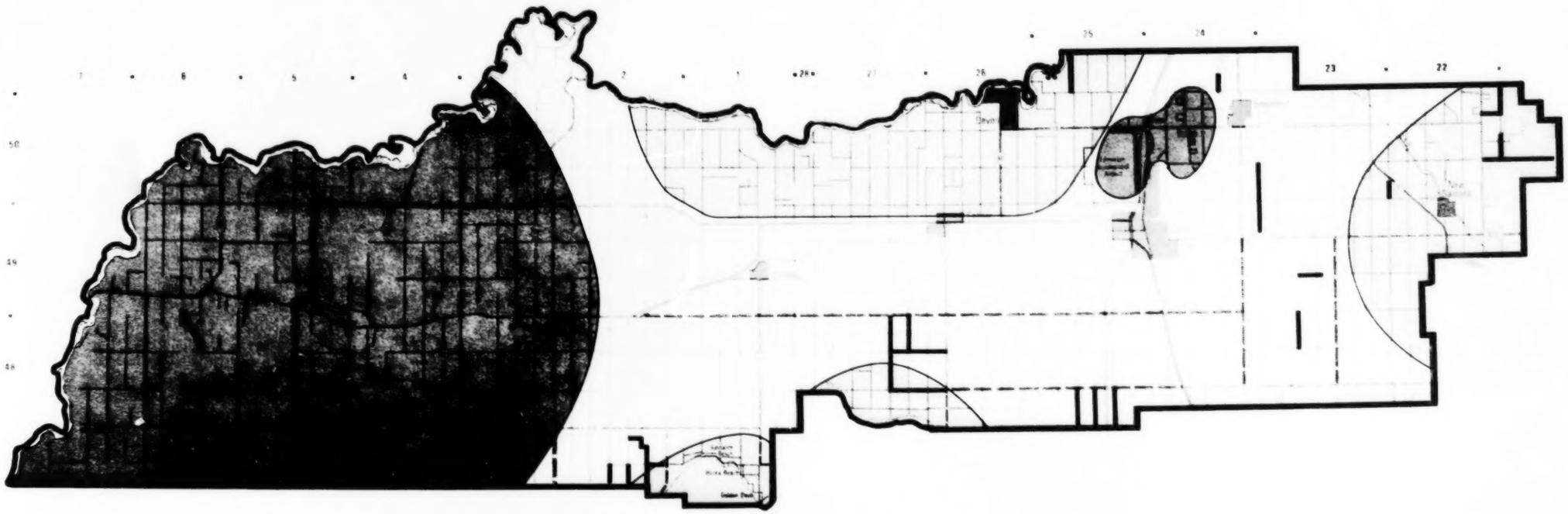
Road system concerns relate to the linkages necessary between lower order and higher order roadways in the existing local road system. The concerns result from an understanding by elected officials and staff of where people travel in and about the study area. More specifically, there are concerns over: internal and internal-external connections; the perceived need for a major east-west internal corridor; secondary road classification for continuity purposes; and recreational travel patterns in the Pigeon and Wizard Lake areas.

2. Public Works Operational Concerns

A major activity of the County is maintenance of roadways. Maintenance is an on-going activity and represents a large portion of municipal road expenditures. Typical problems include: potholes/rutting/washboarding; erosion; soft spots/sliding; deadfall; blind intersections/curves; deep or blowing snow; road flooding; excessive cracking of paved roads; dust; steep shoulders; and poor access visibility.

Table 1 lists common County road maintenance concerns and their probable causes. The current road maintenance policy of the County of Leduc is to resolve as quickly as possible, any maintenance problems as they arise. This is an appropriate policy provided it is possible to meet demands as they arise; however, demand occasionally

COUNTY OF LEDUC **Rural Road System Study**



Major Industrial Traffic

Maintenance Problem

Very High Maintenance

Internal /External Linkage

* Local Access

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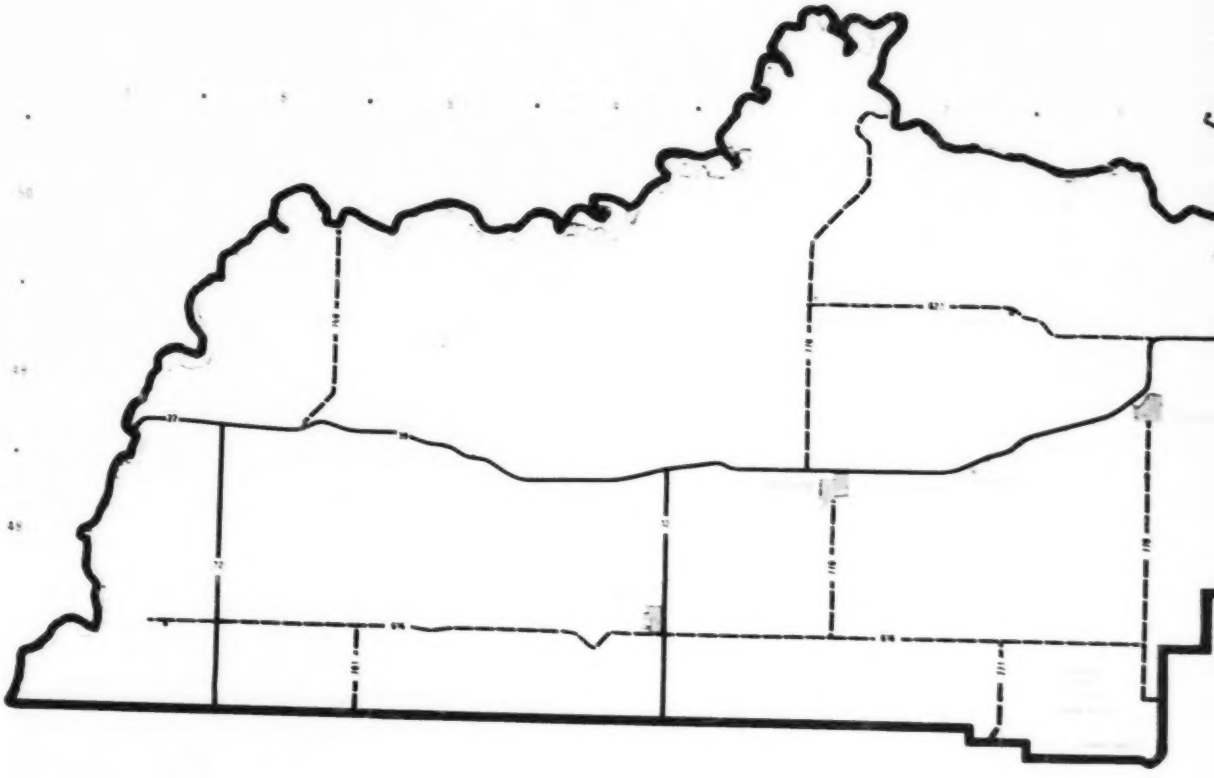
MAP 1

SPECIFIC ROADWAY CONCERNS

TABLE 1
COUNTY OF LEDUC ROADS MAINTENANCE ASSESSMENT

ROAD MAINTENANCE PROBLEM	CAUSE
Potholes/Rutting/Washboarding	High Volume Traffic Heavy Truck Traffic Road Surface Conditions Soil Conditions
Erosion	Steep Slopes Stream Crossings Water Course Edge
Soft Spots/Sliding	Soil Conditions Poor Drainage Underground Spring Excessive Slope
Deadfall	Trees Close to Road
Blind Intersections/Curves	Visual Obstructions
Deep Snow	Heavily Treed Area Depressed Roadways
Blowing Snow	Clearings
Road Flooding	Culvert Too Small Culvert Blocked
Cracks in Paved Roadways	Frost Heaving Excessive Heavy Traffic
Dust (perceived)	Road Surface Conditions
Steep Shoulders	Construction
Access Visibility	Lack of Development Control Severe Elevation Changes

exceeds the availability of road crews to correct problems. When this occurs it is necessary to establish priorities. The highest priority is the Secondary Road network followed closely by the County main road system (see Maps 2 and 3). The maintenance of the remainder of the road system is dependent upon the availability of men and equipment.



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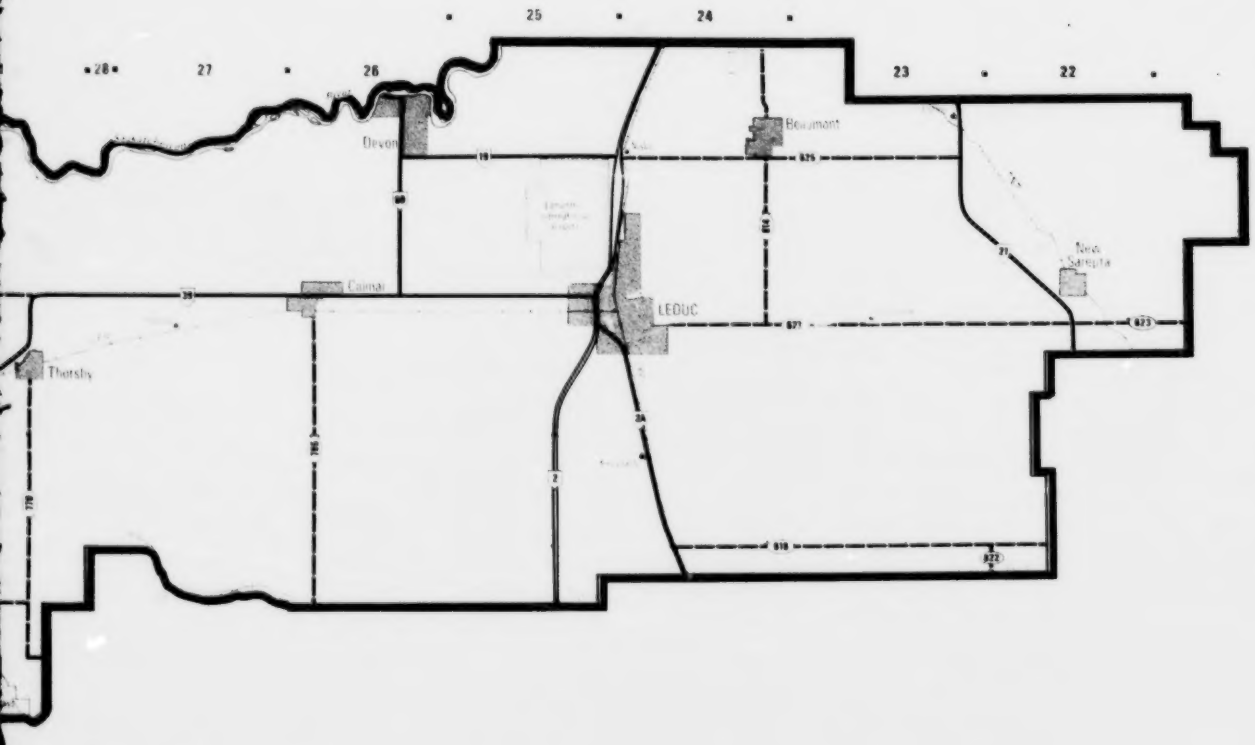
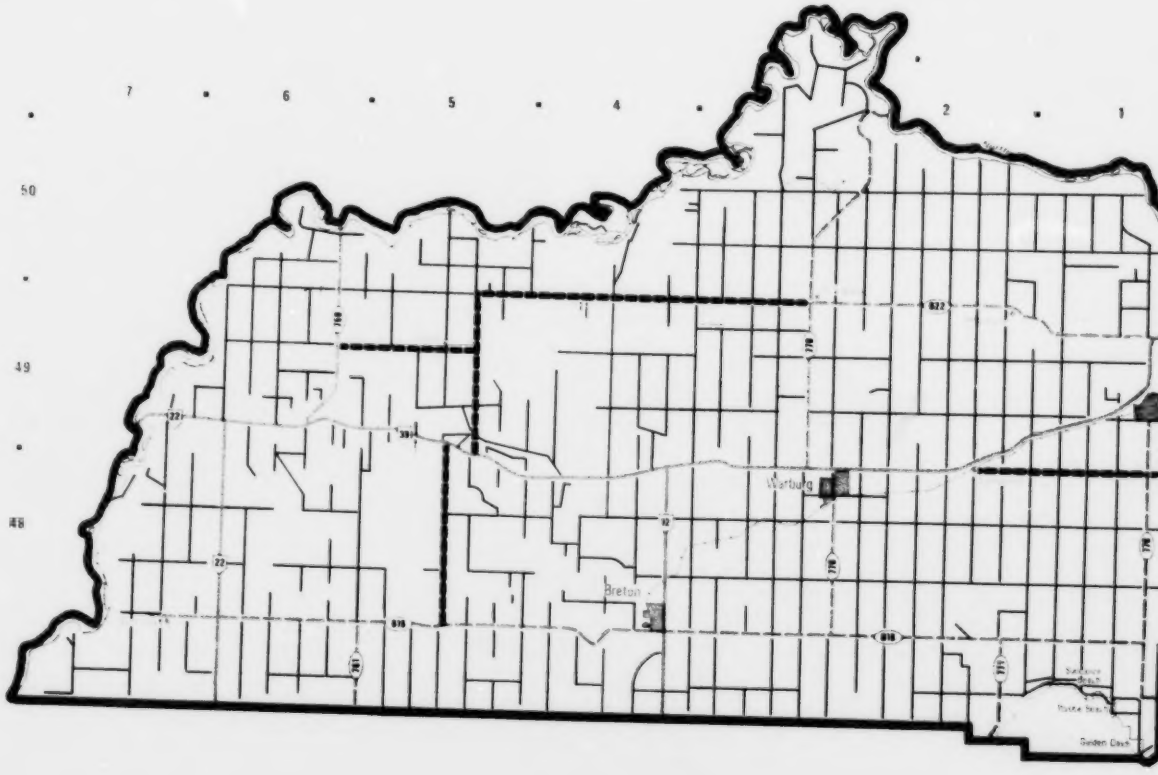


Primary Highway

Secondary Road

MAP 2

PRIMARY HIGHWAYS AND SECONDARY ROADS



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NORTH

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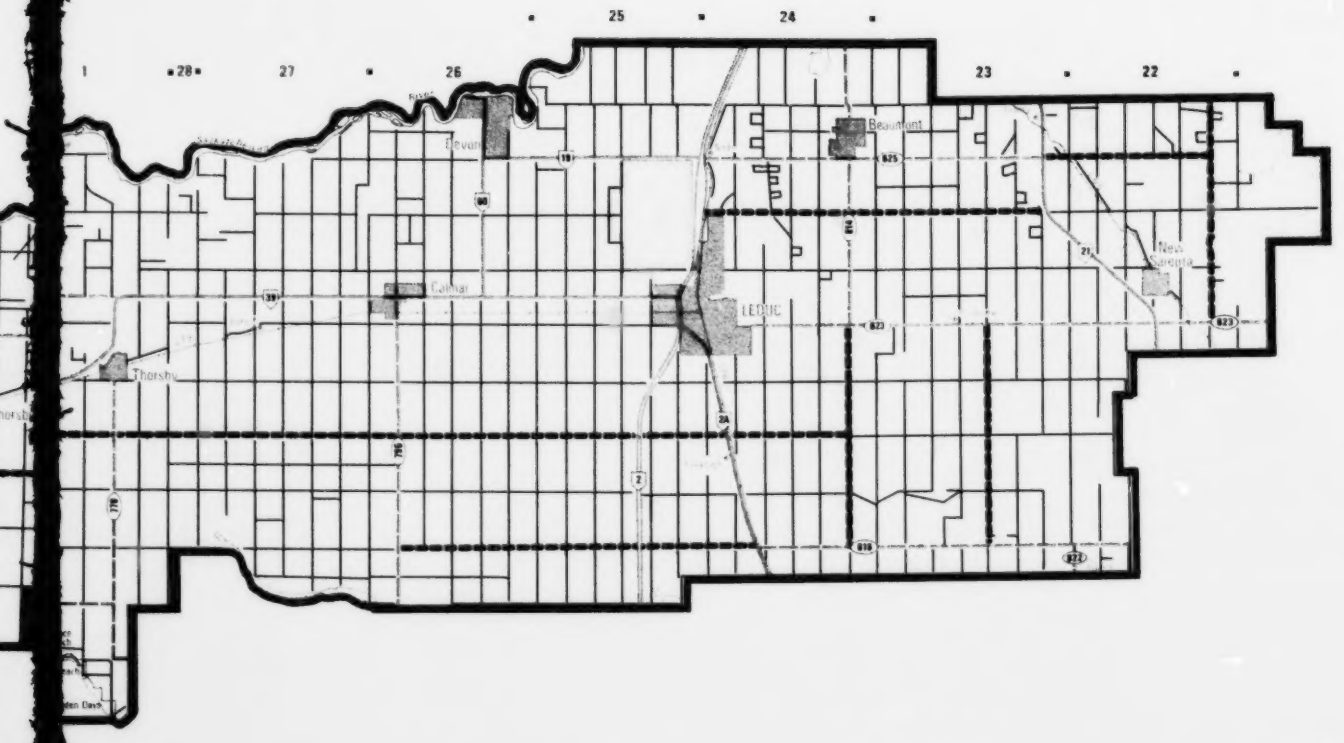
COUNTY OF LEDUC Rural Road System Study



County Main Road

Local Road

MAP 3

COUNTY MAIN ROADS AND LOCAL ROADS

1986

85-3

III. THE TRANSPORTATION MODEL

1. Modelling Process Overview

Travel demand forecasting was undertaken with the aid of a simplified transportation planning program developed by Stanley and Associates Ltd. The principal components of the computer assisted travel forecasting model are the traffic generation and traffic distribution sub-programs.

For this study, daily traffic volume, as opposed to peak hour work trips, was selected as the time unit of analysis. In rural areas, the home to work trip is a small component of regional travel, even during peak hours. Travel in rural areas occurs for many non-work trip purposes (e.g. recreation, social, general business, and school trips) which are not well represented by the travel to work trip pattern.

The travel forecasting model for the County of Leduc Study was developed in response to a number of constraints which prevented the use of more sophisticated modelling techniques. These included limited time and budget and limited availability of base year travel patterns and travel characteristics data. In addition, no comparable rural transportation studies or base year origin-destination studies for the County were available. The development of the model incorporated local knowledge and engineering expertise with respect to reasonable assumptions on trip purpose, classification of traffic, internal/external traffic breakdown and distribution of trip categories by purpose.

In view of the above and the need to create trip tables for existing and future conditions, a simplified computer assisted approach tailored to the needs of this study was developed, as described below.

2. Detailed Modelling Process Description

(a) Transportation Zone System

For the purpose of building a transportation model, the County was divided into a total of 23 transportation zones. The zone boundaries were established so as to be compatible with other transportation studies and to respect expected future growth areas, topographic features, natural barriers and, where practical, census tract boundaries. The internal zones for the rural portion of the County were numbered from 31 to 54 (excluding 37).

Nineteen transportation zones for the portion of the study area external to the County of Leduc were also established. These zones were based on highway, secondary road and significant local roadway interfaces of adjacent municipalities with the County of Leduc.

Eight internal urban transportation zones were identified for the communities of New Sarepta, Beaumont, Devon, Calmar, Thorsby, Warburg, Breton and Leduc. What was referred to as Zone #37 in Background Report #1 was changed to Zone 67 (City of Leduc) to conform to the number sequence of urban zones internal to the County of Leduc.

Map 4 illustrates the transportation zone system used for the transportation model which includes a total of 50 zones.

(b) Population and Employment

Estimates, by transportation zone, of existing population or employment in the County of Leduc formed the basis for the development of base year traffic estimates.

Population estimates were based on 1981 census data which were adjusted to yield an estimated 1985 County of Leduc population of 13,290 persons. The 1985 population for the eight urban zones totals 23,941, for a study area population of 37,231.

The employment estimates for Nisku Industrial Park and the Edmonton International Airport were based on an employment survey undertaken by planning commission staff. These areas will be the major attraction and destination points for travel patterns. A current total of approximately 6,700 employment opportunities was estimated for the County.

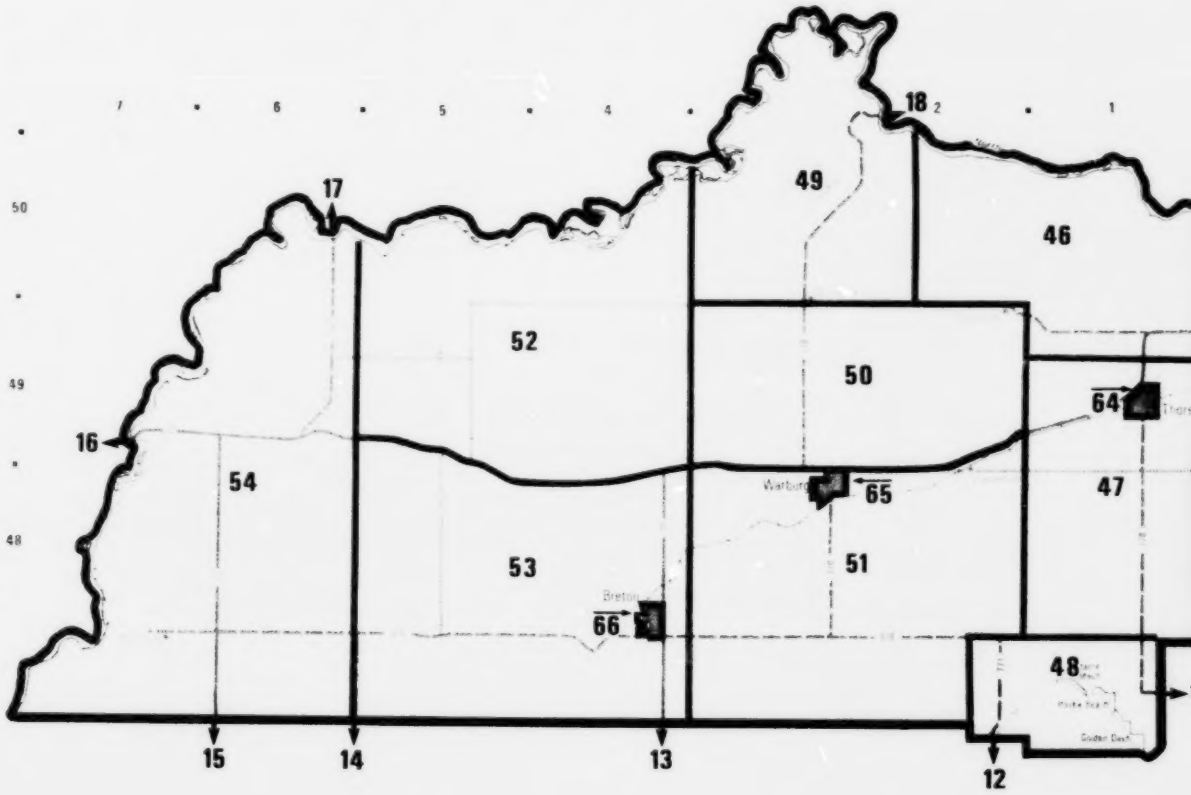
Table 2 summarizes the existing and future population and employment estimates incorporated into the travel forecasting model. For those zones showing employment, these were used in travel forecasting. In all other cases, population figures were used to drive the transportation model.

(c) Distribution of External Traffic

For each external transportation zone, a base year traffic count was recorded. Based on local knowledge of travel patterns and land use activities, an estimate was made of the external/external and external/internal trip movements for each transportation zone (see Table 3).

The total volume of traffic for external zones was observed to be 75,010 of which 27,814 (37%) was estimated to occur between two external zones and the remaining 47,196 (63%) was estimated to be between an external and an internal zone.

The estimated external/external volumes were then distributed among the nineteen external zones. A distribution code matrix was developed which reflected the probability of travel occurring between pairs of external zones. For example, travel from zone 1 is unlikely to be destined for zones 2, 3 and 4. These pairs accordingly received a zero weighting. However,



Edmonton Metropolitan Regional Planning Commission

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September 1986

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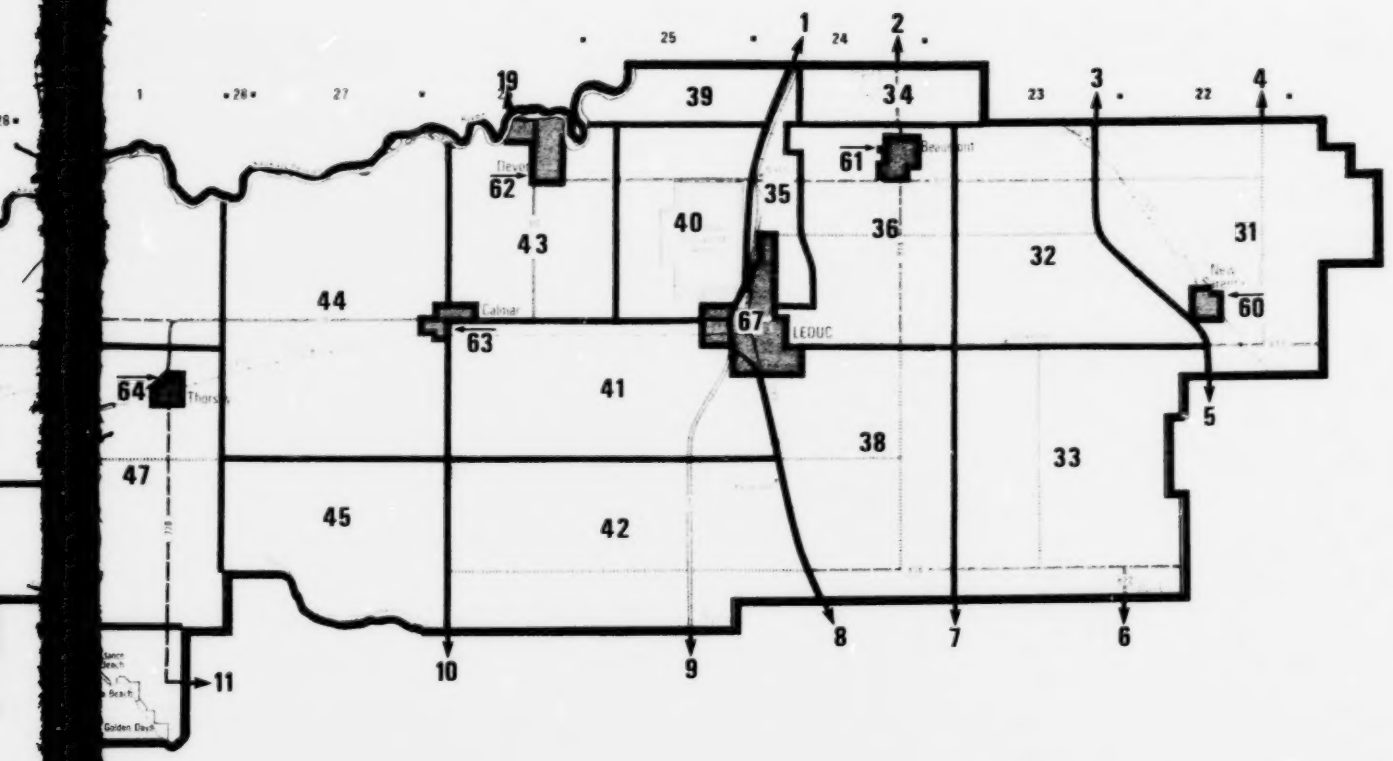
COUNTY OF LEDUC Rural Road System Study



1-19 External Zone

31-54 Rural Internal Zone

60-67 Urban Internal Zone

NOTE: Zone **37** has been changed to Zone **67** as part of the Urban Internal Zone.

MAP 4

TRANSPORTATION ZONES

1988

V85-3

TABLE 2
POPULATION OR EMPLOYMENT ESTIMATES
FOR THE STUDY AREA, 1985 AND 1995

ZONE	POPULATION		EMPLOYMENT	
	1985	1995	1985	1995
31	912	1,125		
32	1,160	1,425		
33	748	875		
34	332	400		
35	30	25	5,000[a]	11,500[a]
36	1,119	1,375		
38	692	820		
39	181	225		
40	264	300	1,700	1,800
41	531	650		
42	827	975		
43	288	350		
44	811	950		
45	423	500		
46	399	475		
47	599	700		
48	126	150		
49	455	400		
50	550	650		
51	842	1,000		
52	423	500		
53	807	950		
54	771	875		
60	461	600		
61	3,723	4,500		
62	3,871	5,400		
63	1,137	1,300		
64	737	875		
65	552	675		
66	534	650		
67	12,926	17,000		
TOTAL	37,231	46,695	6,700	13,300

(a) Refers to the estimated full-time employment opportunities only. Part-time workers or workers dispatched from, but not working at, Nisku Industrial park are not included.

Source: E.M.R.P.C. and B.R.R.P.C. Estimates 1985.

TABLE 3
EXTERNAL TRIP DISTRIBUTION

EXTERNAL ZONES	OBSERVED TRAFFIC VOLUME	ASSUMED DISTRIBUTION		ESTIMATED VOLUME	
		% EXT./EXT.	% EXT./INT.	EXT./EXT.	EXT./INT.
1	34,200	20%	80%	6,840	27,360
2	5,460	20%	80%	1,092	4,368
3	4,490	70%	30%	3,143	1,347
4	330	0%	100%	0	330
5	3,060	70%	30%	2,142	918
6	40	0%	100%	0	40
7	220	20%	80%	44	176
8	4,500	60%	40%	2,700	1,800
9	10,210	70%	30%	7,147	3,063
10	390	20%	80%	78	312
11	300	5%	95%	15	285
12	100	0%	100%	0	100
13	1,220	20%	80%	244	976
14	40	0%	100%	0	40
15	800	70%	30%	560	240
16	2,650	40%	60%	1,060	1,590
17	210	70%	30%	147	63
18	380	10%	90%	38	342
19	6,410	40%	60%	2,564	3,846
TOTAL	75,010			27,814	47,196

Source: E.M.R.P.C.

travel to zone 5 is likely and therefore a weighting greater than zero was assigned. Values between 0 and 1 were assigned on the basis of the likelihood of a trip occurring.

These values in the distribution code matrix were then applied to the estimated external/external traffic counts on the basis of the relative size of traffic flow at each external zone point.

This yielded a two way 1985 external trip table which was then adjusted and refined in order to bring the predicted total volume closer to the known traffic counts and to ensure the reasonableness of the distribution. The results are found in Table 4.

Based on historical growth of traffic and using average annual daily traffic data, traffic volume increases for the external transportation zones were estimated for the 10 year period to 1995. External zones 1, 2, 3, 8, 9, 16 and 19 were assigned growth factors from 1.2 to 1.5. In those cases where there was insufficient historical traffic data, a 1.1 growth factor was arbitrarily applied. These values were incorporated into the travel forecasting model. The external/external trip distribution for 1995 was then broken down in the same way as the base year distribution was calculated.

TABLE 4
EXTERNAL TO EXTERNAL TRIP TABLE, 1985

AVERAGED TWO-WAY TRIP TABLE

EXTERNAL ZONES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Predicted[1]	Estimated[2]	DIFFERENCE
1	0	0	0	0	855	0	24	1428	3990	31	3	0	21	0	63	92	0	0	0	6,506	6,840	4.9%
2		0	0	0	218	0	4	217	608	5	0	0	0	0	0	0	0	0	0	1,051	1,092	3.7%
3			0	0	721	0	12	732	1427	16	0	0	0	0	0	0	0	0	0	2,907	3,143	7.5%
4				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
5					0	0	0	0	0	0	0	0	0	0	0	0	0	0	351	2,145	2,142	0.1%
6						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
7							0	0	0	0	0	0	0	0	0	0	0	0	8	47	44	7.8%
8								0	0	0	0	0	0	0	0	65	0	4	498	2944	2700	9.0%
9									0	0	0	0	0	0	0	178	0	0	1394	7596	7147	6.3%
10										0	0	0	0	0	0	0	0	0	22	73	78	5.9%
11											0	0	0	0	0	0	0	0	9	12	15	22.3%
12												0	0	0	0	0	0	0	0	0	0	0.0%
13													0	0	0	113	19	5	74	232	244	5.0%
14														0	0	0	0	0	0	0	0	0.0%
15															0	313	51	13	90	530	560	5.3%
16																0	84	21	131	996	1060	6.1%
17																	0	0	0	154	147	4.5%
18																		0	0	41	38	8.8%
19																			0	2578	2564	0.6%

Note: The values in this table are rounded to show whole trips. The totals may not be exact.

1. Volume predicted by model.
2. Volume estimated per Table 3.

(d) Distribution of Internal Traffic

Actual trips per capita or per employee were determined, using origin and destination data developed by Alberta Transportation in studies for Nisku Industrial Park, Thorsby, Devon and Calmar. Where no data were available, the transportation model consultant provided generalized trip generation rates based on previous transportation studies and known travel behaviour associated with various land use activities. The trip generation rates used for the study are as shown in Table 5.

TABLE 5

TRIP GENERATION RATES

ZONE	LOCATION/TYPE OF AREA	RATE (trip per person/employee)
35	Nisku	3.0
-	Country Residential Areas	2.0
-	Farming Areas	1.5
60	New Sarepta	1.8
61	Beaumont	1.8
62	Devon	1.4
63	Calmar	3.0
64	Thorsby	2.2
65	Warburg	1.8
66	Breton	1.8
67	Leduc	1.0
50-54	Farming and extensive oil/gas activity	1.7
40	Airport	3.0
48	Resort	1.7

Zones with a high employment base exhibit considerably larger generation rates than those with relatively few employees. Therefore, the vehicle trip generation rates used in the calibration of the County of Leduc travel model are based upon employment levels in zone 35 (Nisku Industrial Park) and zone 40 (Edmonton International Airport). In all other cases, the trip generation rates are based upon population levels. The total vehicular trips for internal zones 31 through 67 are calculated in Table 6.

TABLE 6
INTERNAL TRIP GENERATION, 1985 AND 1995

1985					1995				
INTERNAL ZONES	POP. (EST)	EMPLOY. (EST)	TRIP RATE	VEH. TRIPS	INTERNAL ZONES	FUTURE POP.	FUTURE EMPLOY.	TRIP RATE	VEH. TRIPS
31	912	0	1.7	1,550	31	1,125	0	1.7	1,912
32	1,160	0	1.7	1,972	32	1,425	0	1.7	2,423
33	748	0	1.7	1,272	33	875	0	1.7	1,487
34	332	0	1.5	498	34	400	0	1.5	600
35	30	5,000	3.0	15,000	35	25	11,500	3.0	34,500
36	1,119	0	1.7	1,902	36	1,375	0	1.7	2,338
38	692	0	1.5	1,038	38	820	0	1.5	1,230
39	181	0	1.5	272	39	225	0	1.5	338
40	264	1,700	3.0	5,100	40	300	1,800	3.0	5,400
41	531	0	1.7	903	41	650	0	1.7	1,105
42	827	0	1.5	1,241	42	975	0	1.5	1,462
43	288	0	1.5	432	43	350	0	1.5	525
44	811	0	1.5	1,217	44	950	0	1.5	1,425
45	423	0	1.7	719	45	500	0	1.7	850
46	399	0	1.5	599	46	475	0	1.5	712
47	599	0	1.5	899	47	700	0	1.5	1,050
48	126	0	1.7	214	48	150	0	1.7	255
49	455	0	2.0	910	49	400	0	2.0	600
50	550	0	1.7	935	50	650	0	1.7	1,105
51	842	0	1.7	1,431	51	1,000	0	1.7	1,170
52	423	0	1.7	719	52	500	0	1.7	850
53	807	0	1.7	1,372	53	950	0	1.7	1,615
54	771	0	1.7	1,311	54	845	0	1.7	1,487
60	461	0	1.8	830	60	600	0	1.8	1,080
61	3,723	0	1.8	6,701	61	4,500	0	1.8	8,100
62	3,871	0	1.4	5,419	62	5,400	0	1.4	7,560
63	1,137	0	3.0	3,411	63	1,300	0	3.0	3,900
64	737	0	2.2	1,621	64	875	0	2.2	1,925
65	552	0	1.8	994	65	675	0	1.8	1,215
66	534	0	1.8	961	66	650	0	1.8	1,170
67	12,926	0	1.0	12,926	67	17,000	0	1.0	17,000
TOTAL	37,231	6,700		74,368	TOTAL	46,695	13,300		106,919

The total vehicular trips obtained from the trip generation component were distributed using a gravity model approach. The method is based on the assumption that all trips originating from a given zone are attracted by other zones in direct proportion to the size of the attractor and in an inverse relationship to the distance between the areas. A travel time factor was used to "calibrate" the model to simulate observed travel patterns. The travel time factors (friction factors) for short range (1.0), medium range (0.6), and long range (0.3) travel were input into the model and a trip distribution was obtained for the base year 1985. With the addition of external traffic volumes, the performance of the travel model in simulating travel behaviour in the County of Leduc was reviewed. Adjustments were then made to the necessary traffic forecasting assumptions and trip rates to improve the simulation of base year traffic conditions.

(e) Generation of Trip Tables

The model provided a reasonable simulation of 1985 base year traffic when the predicted values in Table 7 are compared with 1985 vehicle trips in Table 6. Therefore, the future trip table was developed for both internal and external zones. The detailed trip tables for 1985 and 1995 are provided in Appendices 1 and 2, respectively. Table 7 summarizes the distribution of vehicle trips, as predicted by the travel model for 1985 and 1995. Table 8 illustrates the projected future traffic volumes on existing roadway links for various transportation zones within the County of Leduc, and highlights major areas of growth in travel demands. This information is evaluated in the next section of this report, and will be used in developing the recommended rural roadway plan.

TABLE 7
PROJECTED TRAFFIC GROWTH BY TRANSPORTATION ZONE

ZONES	1985[a]	1995[a]	TRAFFIC VOLUME INCREASE #	%	OBSERVATION[b]
1	33,866	40,511	6,645	19.6	moderate growth
2	5,419	8,099	2,680	49.5	high growth
3	4,254	5,041	787	18.5	
4	330	363	33	10.0	
5	3,063	3,414	351	11.5	
6	40	44	4	10.0	
7	223	247	24	10.8	
8	4,744	5,764	1,020	21.5	moderate growth
9	10,659	12,970	2,311	21.7	moderate growth
10	385	425	40	10.4	
11	297	326	29	9.8	
12	100	110	10	10.0	
13	1,208	1,333	125	10.3	
14	40	44	4	10.0	
15	770	780	10	1.3	
16	2,586	3,077	491	19.0	
17	217	238	21	9.7	
18	383	422	39	10.2	
19	6,424	7,652	1,228	19.1	
60	824	1,110	286	34.7	moderate growth
61	6,659	8,316	1,657	24.9	moderate growth
62	5,551	8,004	2,453	44.2	high growth
63	3,467	4,107	640	18.5	
64	1,634	1,902	268	16.4	
65	921	1,079	158	17.2	
66	890	1,037	147	16.5	
67	12,911	17,427	4,516	35.0	moderate growth
31	1,540	1,966	426	27.7	moderate growth
32	1,962	2,494	532	27.1	moderate growth
33	1,268	1,535	267	21.1	moderate growth
34	506	631	125	24.7	moderate growth
35	14,743	32,675	17,932	121.6	high growth
36	1,937	2,463	526	27.2	moderate growth
38	1,059	1,299	240	22.7	moderate growth
39	282	364	82	29.1	moderate growth
40	5,280	5,807	527	10.0	
41	942	1,198	256	27.2	moderate growth
42	1,294	1,585	291	22.5	moderate growth
43	474	602	128	27.0	moderate growth
44	1,359	1,664	305	22.4	moderate growth
45	807	996	189	23.4	moderate growth
46	638	744	106	16.6	
47	954	1,093	139	14.6	
48	229	267	38	16.6	
49	891	750	-141	15.8	decline
50	915	1,031	116	13.0	
51	1,385	1,568	183	13.2	
52	657	744	87	13.2	
53	1,224	1,382	158	12.9	
54	1,166	1,229	63	5.4	

(a) The number of vehicle trips, which are either produced in, or attracted to, the transportation zone.

(b) Moderate growth refers to percentage increase in the 20% to 40% range between 1985 and 1995. High growth refers to growth of more than 40%.

TABLE 8
MAJOR TRIP INTERCHANGES, 1995

TRIP INTERCHANGE	VEHICLE TRIPS	(1985-1995) GROWTH	LOCATION	TOTAL VEHICLE TRIP ENDS[a]	MAJOR TRAVEL PATHS	OBSERVATIONS
Zone 1 (Hwy.2N)/Zone 35	12,186	high	Nisku	40,511	Highway 2 Corridor	. A major commuter corridor serving external/internal trips rather than external to external trips.
/Zone 67	6,005	low	Leduc		Highway 19	
/Zone 9	4,770	moderate	Highway 2 (S)		Highway 39	
/Zone 61	2,861	decline	Beaumont		SR 625	. Major traffic flows between Edmonton, Nisku Industrial Park, Leduc, and other urban zones.
/Zone 62	2,670	low	Devon			
/Zone 40	1,907	decline	Airport			. Reasonableness of projected decline between zones 1 and 40 should be questioned.
/Zone 8	1,710	moderate	Highway 2A			
/Zone 63	1,378	decline	Calmar			
Zone 2 (SR814) /Zone 35	2,432	high	Nisku	8,099	SR 814	. An easterly alternative to the Highway 2 corridor for external to internal trips.
/Zone 67	1,198	moderate	Leduc		Highway 19	
/Zone 9	911	high	Highway 2(S)		SR 625	
/Zone 61	571	moderate	Beaumont		SR 623	
/Zone 62	533	high	Devon			
/Zone 8	326	high	Highway 2A			
Zone 8 (Hwy.2A)/Zone 3	884	moderate	Highway 21	5,764	Highway 2A	. External to external trips.
/Zone 35	802	high	Nisku		Highway 2 Corridor	. Leduc/Nisku major internal focus.
/Zone 19	598	moderate	Highway 60		Highway 19	. Decline between Zones 8 and 40 questionable.
/Zone 67	395	low	Leduc		SR 616/623/625	
/Zone 40	125	decline	Airport			
Zone 9 (Hwy.2S)/Zone 3	1,719	moderate	Highway 21	12,970	Highway 2 Corridor	. External to external trips.
/Zone 19	1,671	moderate	Highway 60		Highway 19	. Leduc/Nisku major internal focus.
/Zone 35	1,364	high	Nisku		SR 623/625	. Decline between Zones 9 and 40 questionable.
/Zone 67	672	low	Leduc			
/Zone 40	214	decline	Airport			
Zone 19(Hwy.60)/Zone 35	1,693	high	Nisku	7,652	Highway 19	. Mixture of through trips and local trips.
/Zone 67	834	low	Leduc		Highway 2 Corridor	
/Zone 61	398	decline	Beaumont		SR 625	. Zone 19 travel patterns indicate the Edmonton bypass function served by Highway 19 and Highway 60.
/Zone 40	265	decline	Airport			. Decline between Zones 19 and 40 questionable.
Zone 32 (W.of Hwy 21)						
/Zone 1	856	decline	Highway 2(N)	2,494	SR 623/625/814	. Considerable traffic interchange is local in nature.
/Zone 35	518	high	Nisku		Airport Road	
/Zone 67	218	high	Leduc		Highway 2 Corridor	. Orientation of internal to external traffic to Highway 2.
/Zone 2	171	low	SR 814			
/Zone 61	105	moderate	Beaumont			. Travel patterns in Zone 32 are representative of those in Zones 31, 33, 34, 36 and 38; moderate growth expected.

[a] Produced in, or attracted to, the zone.

TABLE 8
MAJOR TRIP INTERCHANGES, 1995, continued

TRIP INTERCHANGE	VEHICLE TRIPS	(1985-1995) GROWTH	LOCATION	TOTAL VEHICLE TRIP ENDS[a]	MAJOR TRAVEL PATHS	OBSERVATIONS
Zone 35 (Nisku)/Zone 67	3,299	high	Leduc	32,675	Highway 2 Corridor Highway 19 Highway 39 SR 625	. Second highest vehicle volumes are associated with this zone. . The major origin/destination point for for north/central portion of the County. . Serving external/internal trips. . Large volume of expected traffic growth, associated with a majority of internal and external zones.
/Zone 61	1,587	high	Beaumont			
/Zone 62	1,402	high	Devon			
/Zone 40	977	high	Airport			
/Zone 63	753	high	Calmar			
Zone 40 (Airport)						
/Zone 67	407	high	Leduc	5,807	Highway 2 Corridor Highway 19 SR 625	. Model appears to be a weak predictor for this zone (see Zones 1, 8, 9, and 19).
/Zone 61	195	moderate	Beaumont			
/Zone 62	171	high	Devon			
Zone 61 (Beaumont)						
/Zone 67	667	high	Leduc	8,316	Highway 19 SR 625	. Primarily commuter traffic destined for Edmonton and Nisku (see Zones 1, 2 and 35) and Leduc/Devon.
/Zone 62	281	high	Devon			
Zone 62 (Devon)/Zone 67	586	high	Leduc	8,004	Highway 2 Corridor Highway 19 Highway 39 Highway 60	. Commuter traffic between Devon and Edmonton and Nisku/Leduc.

[a] Produced in, or attracted to, the zone.

IV. EVALUATION OF TRAFFIC FORECASTS

Using the modelling procedure previously described, vehicle trip tables were estimated for the 1985 and 1995 land use scenarios developed for this study. The trip tables enable an examination of both the existing and future rural road network in the County of Leduc.

A detailed review of the trip tables reveals a number of areas where further refinements of the model may have been possible. In particular, the zones associated with the Airport, Genesee and Pigeon Lake areas appear to be imperfectly predicted. In the case of the International Airport and Pigeon Lake, the trip generation rates used do not fully account for the special types of travel between these and other areas. Accounting for the populations of the summer villages along Pigeon Lake, with allowances for the seasonal variations, may have further refined the model. With respect to the Genesee area, the model was based on population; in retrospect, more satisfactory results may have been gained using employment values.

1. Major Trip Interchanges

The weaknesses described above notwithstanding, the trip tables developed for the 1995 land use scenario provide insights into the major trip interchanges likely to occur in the future. Generally, the major trip interchanges do not change significantly for the future land use pattern; however, the absolute volume of traffic between particular transportation zones does change substantially in some cases. This section reviews the major traffic interchanges and their implications on the future roadway network.

The major focus of travel in the study area is concentrated on the Airport/Nisku/Leduc area. Together, these three zones account for about 56,000 trips of a total of 198,000 in 1995, or approximately 28 percent. The remaining urban centres account for over 25,000 trips, or a further 13 percent. Travel associated with the internal rural zones west of Highway 2 (except for the Airport) is more or less equally distributed among a variety of zones, with the only discernable focus being Nisku and the City of Leduc.

Table 7 identifies the projected traffic growth for each of the fifty transportation zones, and identifies which zones are expected to have a significant increase in vehicle trip ends either produced in or attracted to the zone for the 1995 horizon year.

Through a detailed examination of the 1995 trip table, several major trip interchanges are identified and examined with respect to type of trip destinations and origins being served and the likely roadway facilities which are utilized to make those trips. Table 8 examines the key traffic movements identified in the trip table and identifies the relative significance of the various transportation zones.

2. Corridor Improvements

Based upon the projected traffic volumes and trip destinations, two possible corridor deficiencies have been identified for the 1995 horizon year.

(a) Improved North-South Roadway Links for the Eastern Portion of the County

Existing roadways in this area accommodate significant external to external traffic movements, especially between zones 1, 2, 3, 5, 8, and 9. North-south traffic movement is the major direction of travel and the major traffic attractors are Nisku, the International Airport, and the City of Leduc. All of the attractors will continue to grow and therefore attract even larger traffic volumes. Outside of the Highway 2 corridor, there is considerable traffic on the existing road systems including Secondary Road 814, the County main roads, Secondary Road 625 and Secondary Road 623. An alternative to the Highway 2 corridor, most logically SR814/Ord Lake Road, should be considered for improved north-south access to Nisku, the City of Leduc and the International Airport.

(b) A Continuous East-West Route Across the County of Leduc

Highway 39 serves some of the internal, long distance, east-west travel requirements of the County of Leduc, to the point where it meets Highway 2. In comparison to other county main roads, the Sunnybrook-Kavanagh Road also carries substantial volumes of traffic in an east-west direction. At Highway 2, west to east movement is disrupted, particularly in the south-east part of the County. A rural roadway serving internal trip destinations as well as regional (or external trips) would provide service to these portions of the County. Such a link would serve external trips from zones 5 to 9 to points west of Highway 2 and south of Leduc. It would also provide a regional link between Highway 2 and the west side of the County, and Highway 21 on the east side of the County.

The existing Secondary Road 617, beginning at the intersection of Highway 21 at Hay Lakes, could be extended westward to meet the Sunnybrook-Kavanagh Road with its existing Highway 2 overpass and access to Highways 2 and 2A. The proposed Secondary Road 617 would be a more continuous route and would offer better internal access for the eastern part of the County than the existing disjointed alignment of Secondary Road 616. The alignment would require, however, that a major coulee be crossed.

3. Specific Roadway Links

(a) County Main Roads

(i) Joseph Lake Road

This facility primarily serves traffic internal to the County of Leduc, with the City of Edmonton (i.e. Highway 2 North) being the primary external destination. High growth in trip exchanges between this area and both Leduc and Nisku are forecast; however, the volumes are low

enough that any change in designation should be a longer term consideration dependent upon the scale and orientation of regional travel demand and the need for a connection with Highway 14 in the County of Strathcona. In the interim continued road maintenance will be required to ensure the functioning of the roadway. This may be of increasing priority as the forecasted growth materializes, particularly if the volume of truck traffic increases.

(ii) Looking Back Lake Road

As with Joseph Lake Road, this facility primarily serves traffic internal to the County of Leduc and although traffic volumes are moderately high in comparison to other County main roads the redesignation of the road should not be considered until it can be demonstrated that regional travel demands warrant such an action. In the interim continued road maintenance will be required to ensure the functioning of this roadway.

(iii) Airport Road

Considerable traffic interchange is local in nature. The orientation of external traffic is to the Highway 2 corridor, and its connections to Nisku, Leduc and Edmonton. Although Secondary Roads 623 and 625 accommodate high volumes of traffic, it can be expected that the continued development of the Nisku/Leduc/Airport area will place increased demands upon this facility leading to the need for improvements to road conditions in the short term.

(iv) Cloverlawn North Road

The facility serves primarily internal/agricultural traffic. Existing volumes are modest and expected traffic growth is low. No major required improvements have been identified.

(v) Ord Lake Road

As with the Cloverlawn North Road, this facility primarily serves internal traffic with the major destination being Nisku. External traffic is oriented via Highway 2 to the City of Edmonton. Although existing traffic volumes are low, future traffic volumes may require improved north-south connections between Secondary Roads 616 and 623. The general orientation of trips as well as arguments of system continuity favour the eventual widening of this roadway, rather than the Cloverlawn North Road. Its connections with SR814 would facilitate the upgrading of this corridor as a north-south alternative to Highway 2.

(vi) Sunnybrook-Kavanagh Road

This roadway carries the highest volumes of any County main road and serves not only internal traffic but also traffic destined for a variety of locations external to the County. Because of its length and east-west orientation it represents an attractive alternative for traffic moving between the southeastern and the western parts of the County.

It is also well connected with the primary and secondary system, and permits easy movement of local traffic to these higher order facilities.

Although traffic volumes do not warrant a general upgrading of the roadway standard, the County may wish to consider this roadway as a possible future secondary road because of its regional traffic characteristics and in conjunction with the widening of Ord Lake Road.

(vii) Tower Road

Tower Road currently serves low volumes of primarily local traffic and perhaps modest amounts of summer recreational travel oriented towards the Wizard Lake area. It also accommodates some travel from the County of Wetaskiwin in the south. This roadway represents an alternative to the much more highly travelled but somewhat discontinuous Secondary Road 616. Given the existing travel route alternatives and low expected traffic growth, no major improvements are required to this facility.

(viii) St. Francis West Road

This roadway extends west from the intersection of Secondary Road 622 and Secondary Road 770 at St. Francis. It turns south for two miles and connects with Mobuck Road near Lindale. This facility serves primarily internal traffic and vehicles destined for the Drayton Valley area. Low traffic growth is expected and accordingly, only those improvements necessary to maintain the local service function of this roadway are expected (see also Mobuck Road).

(ix) Mobuck Road

This County Main Road facility extends east from Secondary Road 759 to St. Francis West Road, and then south to Highway 39. Existing traffic volumes and expected traffic growth are low. As with the St. Francis West Road, only those improvements necessary to maintain the local service function of this roadway are expected. It is noted, however, that existing traffic volumes immediately north of Highway 39 are quite substantial.

Further, continued development in the Genesee area may generate additional traffic on both Mobuck Road and St. Francis West Road.

Both of these currently accommodate considerable heavy truck traffic associated with gravel operations. This is not expected to be a long term consideration but may have some implications in terms of maintenance priorities. Some clarification of the naming of these two roadways is also required. It is suggested that the names and associated roadway links be as described above, and that some improvements to the signage at key points would help in standardizing the references to these roadways.

(x) Carnwood South Road

This roadway links Highway 39 and Secondary Road 616. Existing traffic volumes and expected traffic growth are low. This facility primarily serves internal traffic and accordingly, no major improvements are warranted at this time.

(b) Other Rural Roadways

(i) North of Buck Creek Local Roadway

This roadway currently accommodates a high volume of traffic and although little growth in traffic is expected, the current volume may warrant special attention to this facility as a service route to local oil and gas facilities.

(ii) Local Access Roads

In addition to the above local road for which a special traffic count was taken, there are a number of other local roads which are of particular concern. Some serve as accesses to a variety of recreation areas, such as Amberlea Meadows, Rabbit Hill Ski Area and the adjacent water skiing facility, Jubilee Park and Pigeon Lake. Recreational traffic is seasonal and is not adequately reflected by AADT volumes. Accordingly, consideration of roadway improvements is local and seasonal, rather than general, in nature.

Other local roads are used as gravel haul routes, gas plant access roads, or access to other special facilities such as the seed cleaning plant or the fertilizer plant. In addition to the traffic volumes these land uses generate, the type of traffic is often destructive of the roadway surface. Maintenance, therefore, is a special concern on such roadways.

(c) Significant Secondary Roads

(i) Secondary Road 616

This roadway provides good access in the west part of the County, but becomes discontinuous in the east-central part. The east-west continuity problem can best be addressed by a new future Secondary Road designation as previously discussed in conjunction with corridor improvements. Secondary Roads 778 and 795 would continue to provide access to the Pigeon Lake and Wizard Lake recreation areas.

(ii) Secondary Road 622

This roadway links Highway 39 north of Thorsby with Secondary Road 770. Existing traffic volumes are moderate and generally associated with the continued development of Genesee. No change in roadway status or function is expected to be required.

(iii) Secondary Road 770

The highest traffic volumes along this roadway are in the vicinity of Warburg. Most traffic appears to be local in nature. North of Warburg, traffic volumes are modest and generally associated with development at Genesee. No change in roadway status or function is expected to be required. The upgrading to a paved standard which is presently underway will meet anticipated Genesee demands not adequately reflected by the model.

APPENDICES

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	31	32	33	34	35	36	37	38	39	40
0	0	0	0	855	0	24	1428	3990	31	3	0	21	0	63	92	0	0	0	602	868	560	219	6681	857	0	467	119	2244
	0	0	0	218	0	4	217	608	5	0	0	0	0	0	0	0	0	0	109	139	89	35	1054	134	0	73	19	358
		0	0	721	0	12	732	1427	16	0	0	0	0	0	0	0	0	0	35	45	29	11	340	43	0	24	6	116
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						0	0	0	0	0	0	0	0	0	0	0	0	0	5	6	4	1	44	6	0	3	1	15
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								0	0	0	0	0	0	0	178	0	0	1394	76	97	63	25	739	94	0	51	13	251
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												0	0	0	113	19	5	74	5	6	4	1	45	6	0	3	1	15
													0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1
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															0	84	21	131	10	12	8	3	94	12	0	6	2	32
																0	0	0	0	0	0	0	4	0	0	0	0	1
																	0	0	1	1	1	0	11	1	0	1	0	22
																		0	28	36	23	30	911	116	0	63	16	310
																			0	21	13	4	140	16	0	9	2	41
																				0	17	5	177	20	0	11	3	52
																					0	3	113	13	0	7	2	33
																						0	36	4	0	2	1	10
																							0	136	0	74	19	347
																								0	0	0	2	39
																									0	0	0	0
																										0	1	21
																											0	5
																												0

APPENDIX N° 1
1985 TRIP TABLE
1 of 1

41	42	43	44	45	46	47	48	49	50	51	52	53	54	60	61	62	63	64	65	66	67	Total	
397	546	57	161	95	79	119	28	28	21	31	16	30	29	365	2949	2385	1501	214	22	21	5688	33866	1
63	87	9	26	15	13	19	5	3	3	5	3	5	5	58	471	381	240	34	3	3	908	5419	2
28	28	3	8	5	1	1	0	1	1	2	1	2	1	19	152	123	23	11	1	1	293	1754	3
5	7	1	2	1	0	0	0	0	0	0	0	0	0	5	37	30	6	3	0	0	72	330	4
14	19	2	6	3	0	1	0	1	1	1	1	1	1	13	104	84	16	8	1	1	200	3063	5
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3	4	0	1	1	0	0	0	0	0	0	0	0	0	2	20	16	3	1	0	0	38	223	7
26	36	4	11	6	5	8	2	1	1	2	1	2	2	24	194	157	99	14	1	1	374	4744	8
44	61	6	18	11	9	13	3	2	2	4	2	3	3	41	330	267	168	24	2	2	637	10659	9
4	6	2	6	4	3	4	1	1	1	2	0	0	0	1	33	27	17	8	1	0	64	385	10
3	4	5	15	9	7	11	3	11	11	17	9	17	5	0	4	28	12	28	12	12	47	297	11
1	2	2	5	3	3	4	1	4	4	6	3	6	2	0	1	7	4	7	4	4	16	100	12
3	4	1	22	13	36	53	13	54	56	85	43	82	78	2	28	16	61	96	59	57	38	1208	13
0	0	0	0	0	1	1	0	3	3	4	2	4	4	0	1	1	1	2	3	3	2	48	14
1	1	0	1	1	3	5	1	17	18	27	14	26	25	1	6	5	3	9	19	18	12	778	15
6	8	3	8	4	22	34	8	113	117	178	90	171	163	5	42	34	21	61	124	120	81	2586	16
0	0	0	0	0	1	1	0	4	5	7	4	7	6	0	2	1	1	2	5	5	3	217	17
4	5	6	18	10	9	13	3	13	14	21	10	20	6	1	5	23	15	23	14	14	56	383	18
55	75	26	74	44	36	55	13	17	17	26	2	4	4	15	407	329	207	99	18	3	785	6424	19
7	10	3	7	4	4	5	1	1	1	2	1	2	2	9	61	13	9	2	2	1	113	1548	31
9	12	3	9	5	4	7	2	2	2	2	1	3	3	11	77	17	12	12	2	2	143	1962	32
6	8	2	6	3	3	4	1	1	1	2	1	2	2	7	49	11	7	8	1	1	91	1268	33
2	2	2	6	4	1	1	0	0	0	1	0	1	1	2	16	11	2	2	0	0	29	506	34
60	82	73	201	110	30	45	11	10	11	16	10	19	19	75	518	376	258	82	13	13	957	14743	35
7	9	0	23	13	3	5	1	1	1	2	1	2	2	9	59	43	29	9	2	1	109	1937	36
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37
4	5	4	12	7	2	3	1	1	1	1	1	1	1	5	32	23	16	5	1	1	59	1059	38
1	1	1	3	2	0	1	0	1	1	2	1	2	2	1	8	6	4	1	0	0	15	282	39
17	24	21	58	34	9	13	3	18	19	29	18	35	35	22	151	108	74	88	4	4	278	5288	40
0	4	4	18	6	2	2	1	3	3	5	3	6	6	4	26	19	13	14	1	1	48	942	41
	0	5	14	8	2	3	1	4	4	7	4	8	8	5	36	26	18	19	1	1	66	1294	42
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								0	36	55	33	64	63	1	4	20	13	47	43	42	50	891	49
									0	57	34	66	65	1	5	20	14	49	44	44	51	915	50
										0	52	103	101	1	7	32	22	76	68	68	80	1385	51
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												0	115	1	9	6	4	27	78	77	16	1224	53
													0	1	8	6	4	26	77	76	16	1166	54
														0	33	7	5	1	1	1	60	824	60
															0	164	34	36	6	6	418	6659	61
																0	81	87	25	25	302	5551	62
																	0	68	17	17	207	3467	63
																		0	59	59	66	1634	64
																			0	52	10	921	65
																				0	10	890	66
																					0	12911	67

2 of 1

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	0	0	0	298	0	5	326	911	7	0	0	0	0	0	0	0	0	0	135	171	105	42	2432	165	0	87	24	381
		0	0	792	0	13	884	1719	17	0	0	0	0	0	0	0	0	0	34	44	27	11	622	42	0	22	6	97
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									0	0	0	0	0	0	223	0	0	24	2	3	2	2	126	9	0	1	1	20
										0	0	0	0	0	0	0	0	18	1	1	1	0	18	1	0	0	0	17
											0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	6
												0	0	0	129	20	0	83	5	6	4	2	92	6	0	3	1	14
													0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	1
														0	324	49	12	91	1	2	1	4	26	2	0	1	0	4
															0	100	25	169	12	15	9	0	289	14	0	7	2	33
																0	8	0	0	1	1	1	8	1	0	0	0	1
																	0	0	1	2	2	0	22	2	0	1	0	21
																		0	28	36	16	29	1693	115	0	68	17	265
																			0	27	21	6	409	22	0	12	3	50
																				0	0	7	518	28	0	15	4	64
																					0	1	316	17	0	9	2	39
																						0	112	6	0	3	1	14
																							0	435	0	228	61	977
																								0	0	12	3	55
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																										0	2	28
																											0	7
																												0

APPENDIX N° 2

1995 TRIP TABLE

1 of 1

41	42	43	44	45	46	47	48	49	50	51	52	53	54	60	61	62	63	64	65	66	67	Total	
398	517	56	151	90	75	111	27	14	20	30	15	29	25	381	2861	2670	1378	284	21	21	6085	40511	1
78	103	11	30	18	15	22	5	3	4	6	3	6	5	76	571	533	275	41	4	4	1198	8099	2
20	26	3	8	5	1	1	0	1	1	2	1	1	1	19	146	136	21	10	1	1	306	5041	3
4	6	1	2	1	0	0	0	0	0	0	0	0	0	4	33	31	5	2	0	0	69	503	4
12	16	2	5	3	0	1	0	0	1	1	0	1	1	12	91	85	13	6	1	1	191	3414	5
1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	4	4	1	0	0	0	8	44	6
2	3	0	1	1	0	0	0	0	0	0	0	0	0	2	17	16	3	1	0	0	37	247	7
26	34	4	10	6	5	7	2	1	1	2	1	2	2	25	188	176	91	13	1	1	395	5764	8
44	58	6	17	10	8	12	3	2	2	3	2	3	3	43	320	299	154	23	2	2	672	12978	9
4	5	2	5	3	3	4	1	1	1	2	0	0	0	1	30	28	14	2	1	0	62	425	10
4	5	6	15	9	8	11	3	9	12	10	9	17	5	1	4	24	13	21	13	13	65	326	11
1	2	2	5	3	3	4	1	3	4	6	3	6	2	0	2	9	4	7	5	4	19	110	12
3	4	1	23	14	30	56	14	43	59	91	46	87	77	3	22	20	63	103	65	63	46	1333	13
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1	1	0	1	1	3	5	1	12	17	26	13	25	22	1	6	6	3	9	19	18	13	780	15
7	9	3	9	5	26	38	9	97	134	206	103	196	174	7	49	46	24	70	147	142	103	3077	16
0	0	0	0	0	1	1	0	4	5	7	4	7	6	0	2	2	1	3	5	5	4	238	17
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54	72	26	78	42	35	52	13	12	16	25	2	4	4	16	398	371	191	94	18	3	834	7652	19
10	13	3	7	4	4	6	1	1	2	2	2	3	3	12	83	22	12	2	2	2	172	1966	31
13	17	3	9	5	5	8	2	1	2	3	2	4	4	15	105	28	15	14	3	3	218	2494	32
8	10	2	6	3	3	5	1	1	1	2	1	2	2	9	64	17	9	9	2	2	133	1535	33
3	4	2	7	4	1	2	0	0	0	1	0	1	1	3	22	20	3	3	1	1	47	631	34
197	261	175	470	279	79	116	28	20	28	44	28	55	49	231	1587	1402	753	213	37	36	3299	32675	35
11	14	9	25	15	4	7	2	1	2	3	2	3	3	13	87	76	41	12	2	2	181	2463	36
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37
6	7	5	13	8	2	3	1	1	1	1	1	2	2	7	46	40	21	6	1	1	95	1299	38
1	2	1	4	2	1	1	0	1	1	2	1	3	3	2	12	11	6	2	0	0	26	364	39
24	31	21	57	34	10	15	4	16	23	35	23	45	41	28	195	171	92	90	5	5	487	5807	40
0	6	4	11	7	2	3	1	3	5	7	5	9	8	6	39	34	18	18	1	1	82	1198	41
	0	6	15	9	3	4	1	4	6	10	6	12	11	8	52	45	24	24	1	1	108	1585	42
		0	10	6	6	9	2	3	4	6	4	8	7	2	35	31	16	16	1	1	73	682	43
			0	16	16	24	6	26	36	57	11	22	20	4	28	82	44	43	15	14	196	1664	44
				0	10	14	3	15	22	34	7	13	12	2	17	49	26	26	9	8	116	996	45
					0	13	3	14	19	30	19	37	34	0	16	48	26	24	25	25	34	744	46
						0	5	20	28	44	28	55	50	1	24	71	38	36	37	36	50	1093	47
							0	5	7	11	7	13	12	0	6	17	9	9	9	9	12	267	48
								0	20	44	27	53	48	1	4	23	12	37	36	35	54	758	49
									0	62	37	73	66	1	6	32	17	52	50	49	75	1031	50
										0	58	113	103	1	9	51	27	81	78	77	118	1568	51
											0	66	60	1	6	5	3	15	46	45	12	744	52
												0	118	2	12	11	6	30	90	83	25	1382	53
													0	2	11	10	5	27	82	80	22	1229	54
														0	47	12	7	1	1	1	97	1110	60
															0	281	45	44	8	8	667	8316	61
																0	133	130	43	42	586	8004	62
																	0	70	23	23	315	4107	63
																		0	68	66	91	1902	64
																			0	61	17	1079	65
																				0	16	1037	66
																					0	17427	67